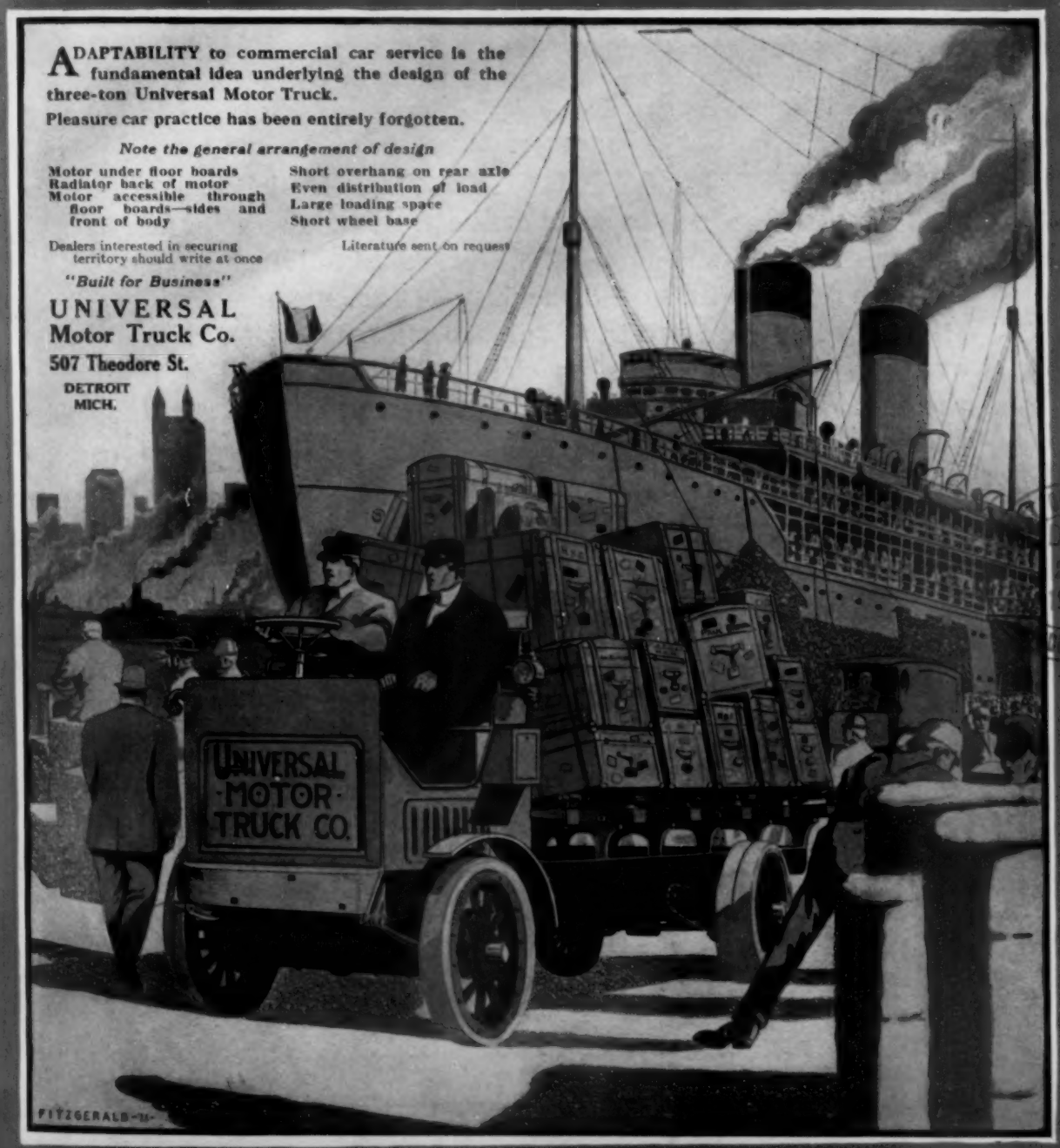
VOL. I. NO. 3 PRICE, 15 CENTS MAY 15, 1911

THE COMMERCIAL CAR JOURNAL


ADAPTABILITY to commercial car service is the fundamental idea underlying the design of the three-ton Universal Motor Truck.
Pleasure car practice has been entirely forgotten.
Note the general arrangement of design
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Radiator back of motor
Motor accessible through floor boards—sides and front of body
Short overhang on rear axle
Even distribution of load
Large loading space
Short wheel base
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UNIVERSAL Motor Truck Co.
507 Theodore St.
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UNIVERSAL MOTOR TRUCK CO.
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HIGH SPEED

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BEARING BRONZE

"The High Price Bronze that Saves Repairs"

The Bearings of your Trucks are small parts, but they are probably the most vital in determining the Truck's efficiency and its ability to give you constant service.

THE BALDWIN LOCOMOTIVE WORKS in replacing the wornout bearings in their entire fleet of Swiss "Saurer" Motor Trucks used NON-GRAN *exclusively.* They have to foot the up-keep bills on these Trucks and, more important still, they have to keep the Trucks on the road day and night every day of the year. They chose NON-GRAN in spite of the fact that its first cost is about twice that of any other bearing bronze made.

¶NON-GRAN High Speed Bearing Bronze differs radically from any other bronze made. Because of its dense structure and extraordinary cohesive toughness, NON-GRAN will not—it cannot—granulate. No amount of frictional stress can separate its component parts. That is why Bearings of NON-GRAN retain their original surface polish throughout their entire life. NON-GRAN will resist and withstand impact and pressures that would put any other bearing bronze out of commission, and will not weaken or depreciate under any condition of service.

¶The open, loose-knit structure of ordinary bearing bronzes is responsible for countless automobile troubles and for heavy repair and renewal expenses. Flaking off is a characteristic weakness of most commercial bronzes. This in itself should be enough to prohibit their use on motor cars. Any bronze that flakes or granulates soon saturates the lubricating oil with minute metallic particles, causing undue wear, not only to the part itself, but to all other parts of the motor reached by the metallized oil. One need not be a mechanical engineer to appreciate the harmful effect this oil is having on every working part of the motor.

¶If you are a Motor Truck Manufacturer or a Motor Truck User, we shall be very glad to hear from you and give you particulars in full about NON-GRAN High Speed Bearing Bronze which is now being so largely and so successfully used.

¶NON-GRAN is built for ultimate economy,—*not* to meet a selling price. Write us now asking for full particulars.

AMERICAN BRONZE COMPANY

BERWYN, PA., U. S. A.

THE PUBLISHERS' PERSONAL PAGE

By C. A. MUSSELMAN

Covers a Broad Field

We have been told by many of our subscribers that the broad field covered by the "CCJ" is doing more than any one other thing to develop this branch of the automobile industry. It is indeed gratifying to know one's efforts in the work of upbuilding are meeting with approval, and as co-operation is essential during the process of development, it is our desire to be in close touch with our readers, and we therefore ask for criticisms and suggestions. If any of the subjects with which we are dealing are deemed unnecessary, or if we are neglecting any particular feature connected with commercial cars and delivery and hauling problems, we would like to be so informed, because the "CCJ" must be useful in every respect to its subscribers. Among the articles which appear in this issue are "The Distribution of Mail by Electrics in New York City." This is an object lesson to prove the utility of the automobile in every-day service. Under the heading of "Meeting the User Half Way" is an interesting outline of how the maker of cars can improve conditions. The data is both instructive and interesting. Mr. K. D. Martin writes on the subject of the commercial vehicle tire and gives many pointers which may be termed as "food for thought." Mr. Charles C. James has written an exceedingly convincing article, the contents of which are stated in the title, "A Co-operative Motor Delivery System with Central Warehouse."

Mr. James

is the author of "A Motor Quick Parcel-Delivery System," which, because of its originality and practicability, has been given world-wide publicity by the lay and motor press.

He is considered an authority in all branches of the commercial utility of the motor, as is evidenced by the fact he is officer and director in a division of the largest automobile company in the world, his division being devoted to the passenger and parcel delivery end of the business. He is called in as an expert by large corporations to solve their delivery problems and enjoys the distinction of having been the founder and president of a taxicab company in the United States which paid its stockholders unusually large dividends.

"Keeping Track of Motor Truck Service"—automatic recording devices a necessity of the modern commercial car—is the descriptive title of a complete analysis of the method by which Mr. Charles B. Hayward shows the commercial car owner the possibilities of knowing how when and where a business vehicle is being operated by one's drivers. "The Necessity and Value of Recording Devices on Commercial Motor Cars" is accompanied by illustrations and descriptions of the various devices now manufactured for the purpose of automatically recording mileage, stops, etc.

In an article entitled "The Truck Salesman Should Be a Transportation Engineer," Mr. E. S. Foljambe has ably outlined the course to be followed by salesmen.

CO-OPERATION

The "CCJ" is earnestly endeavoring to be of service to the commercial car owner, and the larger the number of subscribers, the greater the opportunity for improvement in the publication. This means that the greater the assistance we receive from truck owners the greater the service we can render truck owners, and, as the subscription price is $1.00, there is no reason why every commercial car user in America should not be a subscriber. We spend thousands of dollars monthly for the data printed in the Commercial Car Journal, and as the subscriber receives twelve issues for one dollar, he pays for this service less than ten cents a month. Each issue will contain enough pointers to save the commercial car user many dollars monthly in the operation and up-keep of his trucks. Why not mail us your subscription order without further delay?

Of Interest to Users of Electrics

There are several articles under the following titles: "Electric Autos Growing in Favor," "Mail Distribution by Electrics in New York City."

From Across the Ocean

Our foreign correspondent has some very interesting news for our readers this month. He has written an extremely instructive article which is described by its title, "The Commercial Vehicle in Great Britain"—a review of its development up to the present. Other interesting writings by our foreign correspondent include a description of the British Worm-Driven Turbine Fire Engine and the Dennis Commercial Machines, also points concerning worm transmission, with some European examples.

Commercial Car Descriptions

"Peerless Motor Trucks," with illustrations and detailed description.

"Avery Trucks and Tractors," a complete descriptive article by our Editor, Mr. E. S. Foljambe.

"The McKinney Tractor" (a good example of the use of the commercial car in the agricultural world).

Editorials for the May Issue

include an analysis of the Commercial Vehicle Contest rules as adopted by the A. A. A. Our Editor, believing that there are a number of weak points in these regulations, has pointed out what he considers to be elements which will lead to contention and create strife among contestants.

"Motor Truck Investments Should be Safeguarded." Many commercial car owners don't fully appreciate this condition, and therefore the editorial may be of value as an object lesson.

Regular Headings

In the May issue will appear articles under these different heads:

Among the Manufacturers.

Instructive Experiences.

News of Dealers and Garages.

Miscellaneous

Other articles appearing in this issue are subjects which are best described by their titles.

"Solid Tire Standardization."

"Packards in the Detroit Police Service."

"An Expansible Motor Truck Wheel."

The Autocar

"USED IN EVERY LINE OF BUSINESS"

THE wonderful service which the Autocar Commercial Vehicles are giving is attested by owners and users in every line of business. They are reaching new territory in suburban delivery and are advancing city trade by their use.

Continuous Efficiency Guaranteed

Write for Commercial Car Catalog No. 3-C.
Pleasure Car Catalog No. 4-C.

THE AUTOCAR COMPANY FACTORY
ARDMORE, PA.

MANUFACTURERS OF COMMERCIAL AND PLEASURE MOTOR VEHICLES

(Established 1897)

PHILADELPHIA NEW YORK BOSTON

The Commercial Car Journal

VOLUME I. PHILADELPHIA, MAY 15, 1911 NUMBER 3

Arrangements for National Efficiency and Economy Competition Nearing Completion.—Entries Already Pouring In

FINAL arrangements for the National Efficiency and Economy Competition, under the auspices of THE COMMERCIAL CAR JOURNAL, will be completed in a very few days.

President Robert P. Hooper, of the American Automobile Association, will officiate as the Hon. Referee, and the Governing Committee will consist of the following gentlemen: L. H. Berger, President Quaker City Motor Club; George M. Graham, Sporting Editor *The North American*, and manager of the paper's successful motor Truck Reliability run, Philadelphia to Atlantic City and return; J. Crawford Bartlet, member of Contest Committee, Q. C. M. C.; G. Hilton Gautert, Board of Governors, Q. C. M. C.; E. K. Leech, General Manager COMMERCIAL CAR JOURNAL, and E. S. Foljambe, Managing Editor COMMERCIAL CAR JOURNAL and *Cycle and Automobile Trade Journal*. These gentlemen have had a great deal of experience in contests of all kinds, and are enthusiastically working to make this competition one which will go down in history as the greatest ever attempted.

The judges who will take care of local questions in various parts of the country are rapidly being appointed, and the list when completed will form an advisory board of forty prominent men. These, in conjunction with the Referee and Governing Committee, will formulate the rules for the competition.

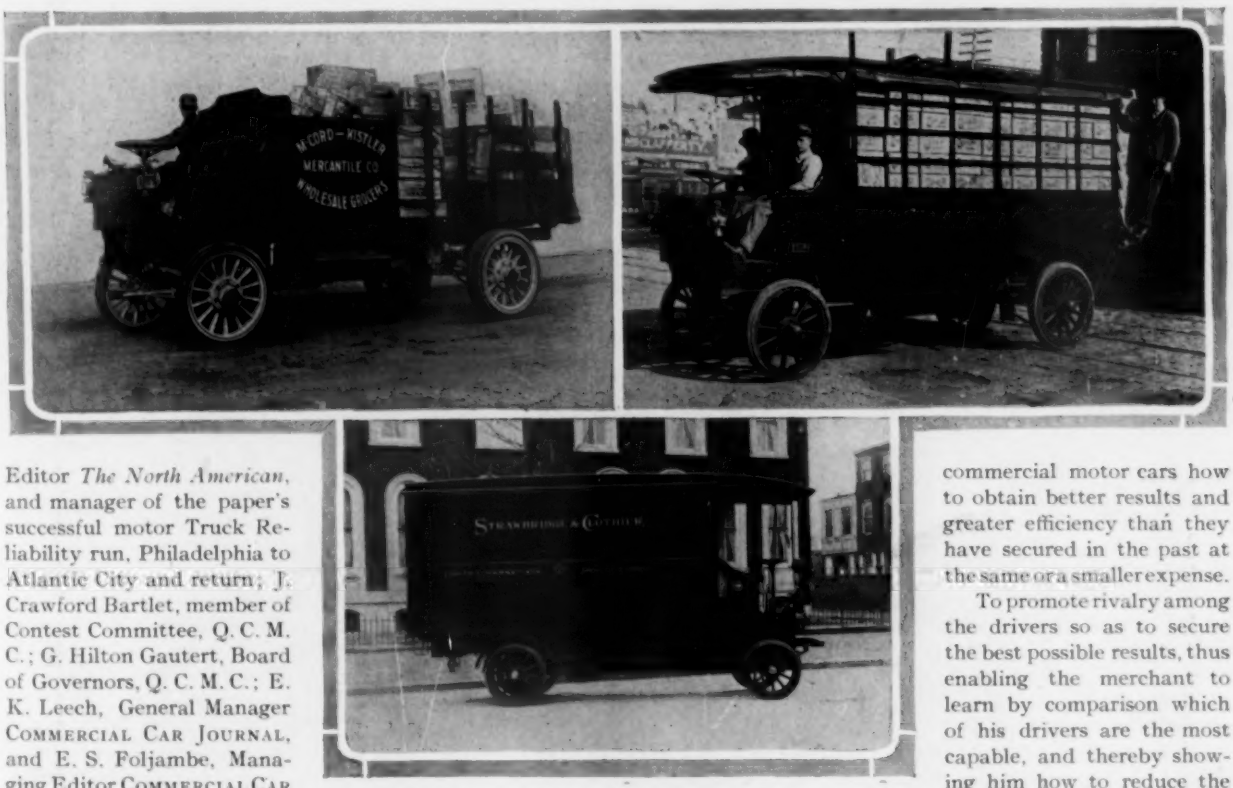
The Purposes to be Accomplished

The purposes of this competition are as follows:

To secure data and records which will show the users of commercial motor cars how to obtain better results and greater efficiency than they have secured in the past at the same or a smaller expense.

To promote rivalry among the drivers so as to secure the best possible results, thus enabling the merchant to learn by comparison which of his drivers are the most capable, and thereby showing him how to reduce the cost of his delivery service.

To demonstrate by records of regular daily service throughout a long period of time, that the commercial motor car is today the most logical and practical method for the transportation of merchandise.



Two Kelly Trucks entered in the National Efficiency and Economy Competition by McCord & Kistler Mercantile Company, wholesale grocers, of Topeka, Kansas, and one of seven Garford Trucks entered by Strawbridge & Clothier, one of the largest department stores of Philadelphia. These trucks are all of two-ton capacity. Those of McCord & Kistler are doing both delivery service and freight trucking, while the Strawbridge & Clothier machines are in their regular delivery service.

The Conditions of the Competition

The competition will extend over a period of six months, starting August 15th, 1911.

There will be no entrance fee. Any corporation, firm or individual (in U. S. and Canada excepting automobile manufacturers and dealers) who owns and operates a commercial motor car in regular every-day service for the handling of merchandise is eligible as a competitor. Station wagons, omnibuses, taxicabs and vehicles designed to carry passengers are excluded.

A competitor may enter as many cars as he desires. A separate entry blank must be filled out for each car entered.

The elements upon which the awards will be based are: The distance covered; number of stops or deliveries; weight of loads hauled; number of hours in service; amount of fuel, oil and electric charging; cost of repairs and replacements,—including tires, the cost of housing, wages paid to drivers and helpers; in fact, every item of cost which goes into the operation and use of the cars during this period.

Blanks for daily records will be furnished by the COMMERCIAL CAR JOURNAL, which will enable competitors to easily compile the necessary data, which will be sent on weekly blanks also furnished by the COMMERCIAL CAR JOURNAL.

Entries Coming in Rapidly

Before the entry blanks for the competition were ready, requests began to pour in for them, and a very gratifying number of entries have already been received at this early date, although the regular distribution of the entry blanks had not yet been made. These are now being distributed, also a poster giving particulars of the competition, and in a few weeks a great list of entries will undoubtedly be received.

Many requests are being received from daily papers throughout the country for information regarding the competition, and especially participants in their particular locality. From this it is apparent that the entrants will receive a great amount of publicity in the daily press.

$1,000 in Prizes to Drivers and Sterling Silver Trophies to Owners

$1,000 in cash will be divided in prizes among the winning drivers, and handsome sterling silver trophies will be awarded to the owners.

The entries will be separated into a number of divisions and classes; cars operating under similar conditions will be placed in the same class, and no division will contain less than ten cars.

Cars will be separated into divisions and classes, awards will be made, and all questions arising during the progress of the competition will be adjusted by the referee, assisted by the Governing Committee, all of whom are well-known disinterested experts, who are not connected with any of the competitors or with any concern manufacturing commerical motor cars or parts entered in the competition.

Judges located in every large city throughout the country, will have general supervision of the competition in their vicinity.

The referee reserves the right to refuse any entry.

All communications and all entries should be made to the COMMERCIAL CAR JOURNAL, Philadelphia, Pa.

How the Records are to be Kept

Many inquiries have been made as to the manner in which the records are to be secured and kept by the drivers and owners, and how they are to be forwarded to the COMMERCIAL CAR JOURNAL for tabulation.

Blanks in pads of 50 of a convenient size to be carried in the pocket if necessary and of the following form will be furnished:

DRIVERS' DAILY REPORT PAD

Entry No. Electric Car No. Date

Current used in charging, K. W. H.
Oil used—Gals. Qts. and Pts.
Grease in pounds
No. trips
No. deliveries
No. pounds delivered
Total miles traveled
Total time in service
Amt. Ferriages & Tolls
Sundry Expenses
Remarks on unusual conditions

Driver's Signature

A separate form for gasoline cars is furnished in which a line for gasoline used is substituted for the line for electric current.

These blanks, after being filled out by the driver, are turned in to the office, where they are transferred to a weekly report sheet which is furnished in duplicate book form, having columns for each day in the week for all of the items given in the drivers' daily report blank, and also a column of totals. To this weekly record are also added the following items to be filled in by some one in authority in the office:

Drivers' and helpers' wages (including overtime)
Share of garage expense charged to this car per week
Cost of—
Washing and polishing
Tire replacements
Tire repairs
Battery repairs
Battery replacements
Repairs to machinery or gear (not through accident)
Repairs to machinery or gear (through accident)
Repairs to body (not through accident)
Repairs to body (through accident)
Supplies and accessories (not otherwise mentioned)
Name parts repaired or replaced
Remarks on any unusual conditions, etc.

This is all that the entrants are called upon to do, and it will be seen that it is a very simple matter and very easily accomplished.

As these weekly reports are made out in duplicate, the commercial car owner retains one and therefore always has a record of his own at hand.

American Automobile Ass'n Commercial Vehicle Contest Rules

The A. A. A. has adopted as a supplement to the 1911 Contest Rules, a new set of rules for commercial vehicle contests. The first portion of these, where they differ from the pleasure car rules, is given below:

Commercial vehicle contests shall be subject to all the general rules and the following special rules:

A registered commercial vehicle shall be one which has been described on an official registration blank provided by the Contest Board, and filed with the Technical Committee of the American Automobile Association at least seven days prior to contest.

Fee for registration $10.00 per model.

Definition of commercial vehicle.—A four-wheeled vehicle designed and built for any other than private passenger service propelled by self-contained mechanical means, fitted with at least two brakes, operated independently of each other, and a motor driven reversing mechanism.

Public Service Passenger Vehicles

Contests or demonstrations for passenger vehicles designed for public service, such as taxicabs, sight-seeing cars, 'busses, etc., may be arranged by special application to the Contest Board.

Classification

Division.	Carrying Capacity.	Speed.
1-K	Up to 500 lbs.	14 miles per hour
2-K	From 501 to 1,000 lbs.	14 miles per hour
3-K	From 1,001 to 1,500 lbs.	12 miles per hour
4-K	From 1,501 to 2,000 lbs.	12 miles per hour
5-K	From 2,001 to 3,000 lbs.	10 miles per hour
6-K	From 3,001 to 4,000 lbs.	8 miles per hour
7-K	From 4,001 to 5,000 lbs.	6 miles per hour
8-K	From 5,001 to 7,000 lbs.	4 miles per hour
9-K	From 7,001 to 10,000 lbs.	4 miles per hour
10-K	From 10,001 to 15,000 lbs.	3 miles per hour
11-K	From 15,001 to 20,000 lbs.	3 miles per hour
12-K	All over 20,000 lbs.	3 miles per hour

Commercial Vehicle Demonstrations

Shall be held under Class K only and run in the twelve divisions above specified.

Shall be subject to the general rules, and in addition to the following special rules.

Grade

Grade 1—A demonstration of any duration in which the competing cars shall maintain a running schedule and be subject to a final examination of the following parts:

Springs for broken leaves.

Brakes for efficiency.

Gear or controllers set for the different speeds.

If gas car, clutch for slipping.

Frame for sag or breaks.

Steering gear for ease of operation and broken and injured parts.

Grade 2—A demonstration of any duration in which penalties are imposed for time only.

Grade 3—A demonstration of any duration in which time penalties are imposed and a record is taken of the gasoline, oil or electric current consumed and the cost of same used to determine the fuel efficiency of the vehicle.

Load

A commercial vehicle must carry its registered load as specified on the Registration Blank. This load to be supplied by the entrant in bags of sand, unless otherwise specified.

Weighing

A commercial vehicle must be weighed without and with its load on the day prior to the start of demonstration. It must be weighed with its load prior to the beginning of and after the completion of the demonstration, and at such time as the referee may require during the demonstration. Weights must be taken separately upon the front and upon the rear axles.

Competing Commercial Vehicles

Only registered vehicles shall be eligible to compete in any sanctioned demonstration, and an examination shall be made before the start of demonstration to check vehicle with registered specifications.

Each commercial vehicle must carry at all times throughout the demonstration its lamp and horn equipments. The fitting of shock absorbers, bumpers, rebound strap or rebound devices is optional.

Sanction should be applied for one month in advance of demonstration.

Preliminary Inspection

435. Contesting cars shall be given a preliminary inspection preceding the start of the contest. At this inspection one representative of the entrant will be present with the technical committee of the promoter.

An inspection card showing the condition of springs, frame, steering pivots, steering gear, clutch parts, transmission and control parts, brakes and brake-operating parts, etc., will be filled out and any noticeable points about each that might later occasion dispute, recorded. This card must be attested by the entrant's representative.

During the preliminary examination there shall be a period of one hour, set by the promoter, before the start, during which all cars shall be on view with bonnets off and floor boards raised, for inspection by competitors. Contestants must be notified of this hour in advance.

Penalties

Two points per minute for being late at control. Two minutes leeway allowed for the variation of watches (a car due at 10.00 o'clock having till 10.02).

Three points per occurrence for taking on oil or gasoline or charging battery at other places than control.

Two points per man per minute or fraction thereof for any replacements that are made on car; such replacements can only be made on the running time of the vehicle.

One hour shall be allowed at the night control for any work necessary, including lubrication, fuel and water, adjustments or making connections for charging batteries of electric driven cars, etc. This work to be done by the driver or mechanic only under the observance of the observer. No replacements can be made in controls.

Road Regulations

486. Entrants and official representatives of entrants shall conform to all laws, ordinances and rules of the road, and any entrant or official representative of such entrant violating any of the provisions of these rules, or who shall fail to show due consideration to the officials or other participants in the tour, or other users of the highways, may be disqualified or penalized, at the discretion of the referee.

486A. An overtaking car which is traveling on a faster schedule than a car overtaken may not, immediately after overtaking the slower schedule car, slacken its pace, but must continue such pace until it is a reasonable distance beyond the car overtaken.

487. Any car whose owner or driver shall be arrested for a violation of speed laws, or of any law or ordinance, may be disqualified or penalized, at the discretion of the referee.

488—When road conditions are so bad that a car cannot get sufficient traction to move, or is ditched, and reasonable effort has been made to extricate it, towing or other external means may be used to relieve the immediate distress only, but under no circumstances shall a car enter a night or any other control except under its own power, and with its full registered load. During such work of extrication, the load may be removed from the car, but this load must be replaced upon car either in part or whole, as soon as car is ready to continue its journey. When towing or assistance from any external source shall have been received by a car, its observers shall make a full and complete report to the referee, giving time, place, conditions, distance of tow, and any other detail.

The sense of this rule is not to permit the towing of a car for any considerable distance, and is intended that where traction conditions prevent a car from carrying its full load up a grade, part of a load may be taken off, the other part being taken up the hill, unloaded, the car returning for the other part of its load, and collecting the balance at the top of the grade or where traction conditions permit. In a condition of this kind, care must be taken not to deposit loads so as to block other contestants.

Test Penalties

The following tests are imperative at the completion of the tests in Grade 1.

503. Brake Test—The car under test approaches a line across the roadway at its competing speed in the contest, as set by an official pacing car, one set of brakes is applied and the distance measured in which the car comes to a stop. The other set of brakes are similarly tested.

A perfect brake stops the car in fifty (50) feet or under; a penalty of one point per foot or fraction thereof is imposed for distances above fifty (50) feet.

504. Clutch Test—The front wheels of the car are rested against a vertical eight-inch curb, the low gear is engaged and the clutch let in. Failure to spin rear wheels, stall the motor or climb curb would be a bad clutch, for which a penalty of five points is imposed.

505. Transmission Test—Car must be driven on all different forward speeds and reverse. Failure to drive on any one speed incurs a penalty of twenty-five (25) points.

Fixed Penalty Schedule.—Running Gear

Broken spring leaves each	5
Broken frame side member	500
Broken frame cross member	150
Bent frame pieces	75

Steering

Broken tie rod or drag link	500
Bent tie rod or drag link	25
Broken steering rod	500
Bent steering rod	25
Faulty steering gear	500
Loose steering connections	15
Broken steering knuckle	500
Bent steering knuckle	15
Broken front axle	300
Steering gear loose on frame	2
Steering column finishing plate on dash lost	2
Yoke pin loose	5
Yoke bearings loose	5

SOLID TIRE STANDARDIZATION

The Society of Automobile Engineers' Committee on Wheel Dimensions for Solid Tires recently held an extended conference with the duly appointed representatives of the tire manufacturing companies. The purpose of this meeting was to aid in determining upon recommendations in the direction of standardization which will bring about the changes which must be met, with proper consideration to the engineering points involved.

Everybody is agreed that standardization of dimensions for solid tires is absolutely necessary. In no other way can be had the essential feature of interchangeability which is vital to wheel manufacturer, tire manufacturer, commercial vehicle manufacturer and the commercial vehicle user. The Society of Automobile Engineers is the generally acknowledged authority in such matters.

The two principal dimensions under discussion were the diameters of wheels to the inside of the tire attachment and the width of felloe.

The tentative recommendation of the Society's committee in regard to wheel dimensions, taking the 36-inch wheel in common use as a starting point (larger diameters progressing with increments of two inches) was that standard diameters might be agreed upon as follows: 2-inch cross sectional tire, size 31½-inch diameter; 2½ and 3-inch cross sectional tire, size 31-inch diameter; 3½ and 4-inch cross sectional tire, size 30½-inch diameter; 4½ and upward to 8-inch sectional tire, size 29¾-inch diameter.

It is acknowledged that these recommendations conform more nearly than anything else to the present standards. But there is much sentiment in favor of making the wheel diameter the same for all widths of tires, for a given diameter. The principal point under discussion and consideration is what this diameter should be for 36-inch tires: 29¾-inch or 30-inch.

The Society's committee recommended that all wood wheels for solid tires should be fitted with a permanent iron band, which is considered necessary to preserve the integrity of the wheels both in stock and in service.

As to the width of felloe the Society's committee recommended that for single solid tires the width of felloe be the same as the width of the tire, and double that in the case of dual equipment.

For certain structural reasons, it is possible that the width of felloe adopted will be ¾-inch less than the nominal width of tire in the case of singles, and for dual tires twice the nominal size.

The tolerance allowable in the circumference of metal bands was recommended to be as follows:

Before application to wheel:

Minus	0
Plus	1-16 in.

After application to wheel:

Minus	0
Plus	⅛ in.

The minimum depth of wood felloe was recommended to be:

Tire Size.	Felloe Depth.	Tire Size.	Felloe Depth.
2 in.	1¼ in.	5½ in	2 in.
2½ in.	1½ in.	6 in.	2 in.
3 in.	1½ in.	6½ in.	2⅛ in.
3½ in.	1½ in.	7 in.	2⅛ in.
4 in.	1¾ in.	7½ in.	2⅛ in.
4½ in.	1¾ in.	8 in.	2⅛ in.
5 in.	2 in.	Above 8 in.	2⅛ in.

The committee has recommended that the commercial use of these standards should go into effect Jan. 1, 1912 giving a reasonable allowance for the manufacturing changes involved.

It is stated that already wheel and tire manufacturers have expressed their willingness to adopt the standards.

It was argued at the meeting that the work of determining upon a standard detachable rim for solid tires should now be started. Deliberation upon standard dimensions for demountable rims for penumatic tires is now being had by the S. A. E. committee.

There has been considerable discussion as to whether solid tires below 3-inch diameter should be standardized on a so-called "truck basis." That is, whether, in view of the not infrequent change from solid to pneumatic tire equipment in this size of tire, it would not be better to conform to existing pneumatic tire standards.

Another point under consideration is whether the actual diameter of a tire on a wheel should be very close to the nominal diameter. Given standard wheel dimensions, the overall tire diameters will, within limits, of course, depend on the tire heights, that is, the depth of the section of rubber. Rubber diameters after some time in service do not remain just what they were at the time the tires were newly put on, and fractional inch variation must, it would seem, be countenanced at the time of installing equipment.

An investigation of the extent to which, if any, cars are under-tired as regards size, raises several complex issues. It is perfectly clear that there should be a standard table of weight-carrying and speed capacities of tires. Here average must prevail. Strangely enough, geography figures; the nature of the roads and topography are elements in the case. Again, in some instances commercial motor vehicles are guaranteed to carry certain overloads over the rated carrying capacity.

COMMERCIAL CARS IN NEW YORK CITY PARADE IN RAIN

A parade of commercial motor cars was recently held in New York City under the auspices of the Motor Truck Club. The event took place on the 22d of April in a pouring rain, which would have effectually put a stop to a parade of an ordinary character. However, motor trucks are above ordinary weather conditions and over two hundred machines took part. Unfortunately, they ran somewhat faster than was best for a parade, getting separated, and when held up at the main cross streets by the traffic policemen, other vehicles, such as taxicabs, omnibuses, etc., broke into the organization. Nevertheless, the sight of so many and varied types of loaded vehicles displaying signs and flags attracted considerable attention.

Trucks Parade in the Rain

This snapshot of the recent truck parade in New York City shows how the participants allowed long gaps between the cars. There were over two hundred trucks in line

The parade took place at the busiest time of the day for traffic in the center of the city, which necessitated more frequent stoppages at the intersecting thoroughfares. The line was headed by the police scouts, Inspector O'Brian and two of the captains, then came the pacemaker and a fleet of official touring cars, furnished by Emanual Mascaris, of the DeDion-Bouton Company, then followed a large 'bus filled with musicians. The line was then made up of over two hundred trucks, ranging in size from the small Chase and Ford delivery wagons up to five, seven-and-a-half and ten-ton brewery and coal trucks. The new Remington seven-and-a-half-ton truck with Manly Hydraulic change-speed mechanism was one of the novelties of the line-up. The electric vehicles were also well represented. The route covered a distance of some twelve miles, most of which was on Broadway and Fifth avenue, and included the one-mile "Cracker Hill," on which the heavily loaded trucks on the slippery pavements showed their superiority over horses.

The Motor Truck Club

The recently organized Motor Truck Club, which organized and managed the event through Chief Marshal F. B. Porter and his able assistants, has a membership of those in and near New York connected with the manufacture or sale of commercial cars and their component parts. The membership is a personal one, not by firms. Monthly meetings with suitable papers are regularly held, the object, of course, being to bring about better conditions in the operation and sale of trucks and to formulate plans for the control of truck demonstrations, exchange of second-hand vehicles, and other matters of direct interest to the members. The officers are: President, F. B. Porter; vice president, Albert T. Otto; secretary, Luther E. Levy; treasurer, C. E. Stone.

TRUCK PARADE FOR PHILADELPHIA

Inspired by the motive of giving a striking object lesson to merchants and business men, a leading newspaper, *The Philadelphia Inquirer*, makes announcement that it will father the holding of a mammoth motor truck parade, which is to be held Thursday, June 8th.

This parade will include all the types of power-propelled commercial vehicles now in use in Philadelphia or about to be introduced in this territory, and will be the means of demonstrating to the public in most convincing fashion the wide range of usefulness to which the motor truck has already been put and of suggesting the endless transportation uses to which the new merchandising factor will readily adapt itself.

As a finale to this industrial demonstration through the principal business thoroughfare of the city, the participating trucks and delivery wagons will be placed on exhibition in Belmont Driving Park, where luncheon will be served to those taking part in the pageant.

NEW SOURCE OF RUBBER SUPPLY

Until within the last few years the principal sources of rubber could be divided into two zones; that of the Amazon, comprising Peru, Brazil and Bolivia; and the African, which includes the Congo and Eastern Africa.

New countries have now entered the market, competing formidably with South American rubber. To illustrate the advance in production, let us take as an example Ceylon, whose exportation of rubber has increased progressively from 3353 kilos in 1901 to 597,000 kilos in 1909. Large areas are also being planted in Java, Sumatra, Borneo, Malasia and the Straits.

AUTO TAX BILLS DEFEATED

The McNichol and Caldwell bills which were proposed by Senator McNichol, of Philadelphia, and by Representative Caldwell, have both been defeated. The McNichol bill called for a fee of $25, $50 and $75, according to the sizes of the cars, there being three classes—one for large pleasure cars, another for smaller pleasure and business vehicles, and a third for commercial trucks. The other bill was for a fee equal to one per cent. of the original cost of the car.

THE GOODRICH TIRE COMPANY has equipped the three-ton truck of Crane & Hawley, of Cincinnati, Ohio, with six 5-inch wireless solid rubber tires, by all odds the largest truck tires in that city. Their cost was about $600.

Keeping Track of Motor Truck Service

AUTOMATIC RECORDING DEVICES A NECESSITY OF THE MODERN COMMERCIAL CAR

BY CHARLES B. HAYWARD

That the introduction of the motor truck on a wide-spread scale is responsible for a wholly new set of operating conditions is just coming to be realized. Each unit in a large equipment is so very much more effective than a horse-drawn truck ever could be that the question of utilizing its ability to the maximum is one requiring considerable study to so lay out trips as to avoid idle time. Generally speaking, it is safe to say that the average manager of a delivery service in which horses have been replaced to a greater or less extent by commercial cars does not realize at first how very much more efficient each unit of his equipment actually is, while even those who have had two or three years' experience in the handling of a motor service, after long familiarity with horse-drawn wagons, constantly find new possibilities. The manager of a delivery service can accordingly only estimate what the ability of each motor wagon is and plan its trips in accordance with schedules that are based upon calculation rather than actual experience in the handling of the machines on the road. Such schedules are more apt to represent a conservative estimate of the car's ability than otherwise, and the experienced driver can not only cover the ground very easily, but also find ample time to spare.

Even where schedules are laid out with a better realization of the ability of the machines to get over the ground, by maintaining a higher average speed, a good driver can do so much more than is expected that frequent opportunity for deviation or loafing is afforded. As drawn up for horse equipment, regular delivery schedules, such as those adopted by department stores and other large retailers, so frequently tax the ability of the horses and drivers that it is unusual for them to return on time. Maintenance charges for horse equipment in large cities are so high, particularly on account of the great amount of high-priced space necessary to house a large number of horses and wagons, that the service must be worked to its maximum capacity in order to keep delivery costs down. If it had not been for the opportune introduction of the commercial car a few years ago, the problem of taking care of the increased business during the past several years would have been a difficult one to solve.

More than ninety per cent. of this increase has been taken care of in the majority of instances in large cities, by the adoption of motor equipment. While considerably less storage space is necessary, and a great saving is effected in this item, as well as by the much greater efficiency of the trucks themselves, the equipment itself represents such a large initial investment that a far more detailed study of the requirements is necessary in order to obtain the maximum return. Commercial cars are too valuable, whether a few or a number are employed, to permit of operating them at only a fraction of their ability, regardless of how substantial an increase over horse wagons this may represent. To obtain the best return on the investment, full advantage must be taken of the capacity of the truck, not alone to carry heavier loads, but to cover a great deal more ground. Idle time costs as much more in proportion, in comparison with horse-drawn wagons, as a motor truck is capable of performing as compared with a horse truck. Time lost can be figured as dollars per hour rather than dollars per day, as in the case of horses and wagons. For this reason, quite a number of the large companies in New York City, such as the express companies and large coal dealers work their motor equipment twenty and twenty-four hours a day right through the busy season. As this is in winter, the operating conditions are the most severe, but the demands are such that it is considered better business policy to pay double wages to drivers and helpers for night work, rather than increase the equipment to a point where it would be capable of taking care of what engineers term the "peak of the load" during the working day, in view of the tremendously greater investment that this would involve, as well as the increased overhead charges resulting from keeping such a large amount of equipment idle for at least twelve hours out of every twenty-four. There is an additional advantage, in that traffic conditions are much more favorable and better running time can be made at night in congested districts of large cities.

But to be able to take full advantage of the commercial car's ability, whether on service in regular delivery schedules, such as department stores employ, or in general service where practically every trip may differ more or less, more definite data is required than the traffic manager can obtain from drivers' reports, or from calculations based upon experience gained entirely at headquarters. The manager cannot personally go over all the routes even where they do not vary much from day to day. There are usually too many of them in such cases. Granted that he could cover every delivery route in person at least once as a means of obtaining data upon which to base such calculations, the latter could not be relied upon as meeting every case. One test run, or even several, would not be productive of sufficient data upon which to judge of the ability of the different types of commercial cars. Such runs might be made under more favorable, or on the other hand, less favorable conditions than usually obtain, and they would consequently afford no criterion. The manner in which the average driver handled his machine under the eye of the manager would not be the same as that followed in daily service.

At present, the only thing of which the checker at headquarters can be certain is the time at which the various machines leave on their trips and their time of returning. What is needed is "automatic supervision" and only a recording device attached to the machine itself, can effectively carry this out. It will be evident that the ordinary speedometer and odometer fall considerably short of filling this need. They show trip and total mileage, but they cannot show anything else. In itself, this is important information, but

the number of stops made, the duration of each stop and the mileage between them is far more so. Considerably more time than is necessary may be allowed for covering what are regarded as the more difficult parts of certain delivery routes, and a recording device which gives such information will show them to be the contrary, as it will reveal the speed at which the vehicle was driven between each stop. The number of stops and their location on certain delivery routes being known, this record will likewise reveal at once whether any deviations have been made, and whether a higher speed has been maintained on other parts of the route in order to compensate for the unwarranted use of the machine. In other words, it forms a complete check on the driver of the vehicle, and a study of the records from day to day will not alone indicate any short-comings on the part of the former, but will also make apparent possibilities of taking fuller advantage of the ability of both in getting work done. Experience has demonstrated that in city and suburban service, even the electric is capable of accomplishing more in a day than lies within the ability of its crew, so that obtaining the maximum return on the investment represented by an extensive motor equipment becomes largely a question of the personal equation taken in connection with what the machines themselves are capable of performing.

The need for a device that would give more information regarding the running of the machine than is afforded by an odometer was realized two or three years ago, and an automatic recorder, giving time, mileage, stops and similar details was brought out on the Continent. Motor trucks have been in general use abroad for a much longer period than here and are at present more largely used, and in a greater number of different forms of service. An attempt was made to market an automatic recording device of a similar nature here shortly after. It printed its record on a continuous tape, but the record itself was too involved and called for too much translation before it could be made available as data to render the device practical. Later devices which have appeared also proved to have short-comings of one kind or another, so that of those which were brought out two or three years ago, probably few, if any, have survived—at least not in their original forms.

Elsewhere in this issue of the COMMERCIAL CAR JOURNAL will be found complete illustrated descriptions of a large majority of the instruments manufactured for the purpose of recording in one way or another, the movements, stops, speed and loads of commercial cars.

It will be apparent that in no way, other than by the use of an instrument of such a nature, can a proper check be kept upon the movements of a commercial car, especially in work involving the serving of long routes which keep the machine on the road from early in the morning until after the close of the usual business day.

PERSONAL NOTES

W. C. LANG has resigned from the Centaur Motor Company to accept a position as special sales representative of the Remy Electric Company.

THE JOSEPH DIXON CRUCIBLE COMPANY, of Jersey City, N. J., has secured the services of Sherman Paris in the advertising department, to succeed H. S. Snyder.

A. T. HENDERSON, recently the New York representative for the United Manufacturers, has joined the Atlas Chain Co., of Brooklyn, N. Y., as general sales manager, and will have charge of the selling forces of that company.

ARTHUR E. CORBIN, formerly manager of the truck department of the Packard Motor Car Company, of New York, has assumed his new position as assistant sales manager of the Packard Motor Car Company, of Detroit.

THE DUPLEX MULTI-SPARK PLUG CO., of Devil's Lake, N. Dak., has recently employed E. O. Dickinson as their traveling representative. Mr. Dickinson is establishing agencies for the above company throughout the United States.

WILL H. BROWN of Indianapolis, Ind., who recently resigned from the Willys-Overland Automobile Company as vice president and general manager, has accepted the position of president and general manager of the Mais Motor Truck Company, succeeding Charles A. Bookwalter.

THE LEATHER TIRE GOODS COMPANY, of Niagara Falls, N. Y., who has maintained a branch store at 1407 Michigan avenue, Chicago, in charge of Mr. V. W. Bonham, has discontinued this branch and in future Mr. Bonham will devote his entire time to visiting the trade in the larger cities of the Middle West.

THE UNIVERSAL MOTOR TRUCK CO., of Detroit, Mich., announces the appointment of F. R. Bump to the position of sales and advertising manager. Mr. Bump was formerly connected with the H. H. Franklin Manufacturing Co. as general sales manager and later as sales and advertising manager of the Reo Motor Car Co., of Lansing, Mich.

GAYLORD CHANGES.—A number of changes have taken place lately in the Gaylord Motor Car Company, of Gaylord, Mich. John L. Pelton, the secretary, has resigned, and has been succeeded by Seth M. French. John Hixson, of Vanderbilt, has become one of the directors of the company, succeeding Mark Demerest. A. H. VanDoran has taken charge of sales in Michigan, and is now on a demonstrating trip. Guy Hamilton, the general manager of the company, has taken personal charge of the purchasing department.

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CONTENTS

	PAGE
American Automobile Association's Commercial Vehicle Contest Rules	5
Among the Manufacturers	53
Avery Trucks and Tractors—By E. S. Foljambe	60
British Worm-Driven Turbine Fire Engine, A, The Dennis Commercial Machines	27
Commercial Vehicle in Great Britain. A Review of Its Development up to the Present—By Our Foreign Correspondent	23
Commercial Vehicle Tire, The—By K. S. Martin	21
Co-operative Motor Delivery System With Central Warehouse, A—By Chas. C. James	12
Guaranteed Commercial Car Delivery Service—By E. S. Foljambe	14
Instructive Experiences	41
In the World of the Electric	16
Keeping Track of Motor Truck Service: Automatic Recording Devices a Necessity of the Modern Commercial Car—By Chas. B. Hayward	8
Mail Distribution by Electrics in New York City	17
McKinney Tractor, The	52
Meeting the User Half Way: How the Maker may Improve Conditions	18
Necessity and Value of Recording Devices on Commercial Motor Cars, The	33
News of the Dealers and Garages	48
Peerless Motor Trucks	57
Points Concerning Worm Transmission: Some European Examples—By Our Foreign Correspondent	43
Solid Tire Standardization	6
Truck Salesman Should be a Transportation Engineer, The	49

MOTOR TRUCK INVESTMENT SHOULD BE SAFEGUARDED

It is surprising how few business men plan to safeguard their investment in commercial cars in the same way that they do all other investments in their business of equal, or even much less amount. It is not at all unusual for even a moderate-sized company to have from $5,000 to $25,000 invested in their commercial car equipment, yet to the average man the machines are looked upon simply as trucks. They are too often placed entirely at the mercy of careless operators and garage men, and no special precautions whatever seem to be taken by the owner, to safeguard this important investment. Untrained and more or less lawless drivers are often employed, and these valuable machines turned over to them, to pound them over the cobblestone pavements and car tracks just as they see fit. No attempt whatever is made to keep a record of how fast, how far, or what loads are placed on the vehicles.

The same truck owner perhaps purchases a small stationary engine, or other mechanical equipment, the price often not exceeding that of a single truck; in one case he hires a highly trained and competent man to safeguard his interests and look after the plant; time clocks, governors, recording devices, etc., are installed to make sure that the equipment is not abused. On the other hand, an equal investment in the form of a road locomotive containing an equal amount of delicate machinery is turned over to an irresponsible driver to do with as he pleases. The owner seems to feel that after purchasing a truck and hiring a driver, his duty is done and usually balks when the suggestion is made that he spend $35 or $40 for some reliable speed and recording instrument, which will keep an absolute and accurate record of what the driver is doing with the truck. It may be that the initial cost seems so large to the owner, that he is loth to put any more money into the equipment; this of course is an extremely short-sighted policy and one that is hard to reconcile as coming from apparently shrewd, keen business men.

Too many seem to take it for granted that anything and everything can be done to the truck and that it will continue to give satisfactory service indefinitely. If the owner would only look at it more in the light of an investment, which must be properly taken care of, in order to get from it a proper return in the form of economical transportation of goods, every reasonable precaution would be taken to prevent the costly mechanism from being abused. It is unjust to the manufacturer, and in the end very unsatisfactory to the owner, when no care whatever is taken of the manner in which the investment is handled.

It is true that the new form of vehicle takes the place of an ordinary horse and wagon, but this is no reason why it should be cared for in the same careless way. Being a machine it lacks the intelligence of the horse, which in some cases is depended upon by the careless or incompetent driver. It requires systematic, careful adjustment, lubrication and rest. Simply because it is a machine, is no reason that it should be called upon to work continuously, or that it should be forced to carry loads in excess of those for which it was designed; nor should it be forced at high speed over all kinds of roads just because it has the power to carry it over any and all obstacles.

Locomotives which operate on rails with always a smooth roadbed, are never run but a few hundred miles without receiving a through inspection, yet the automobile truck is expected to run without attention for thousands of miles under the worst possible conditions and is blamed as being defective if it does not stand up under this treatment. It is not looked upon as a weakness in the locomotive that it is necessary to so carefully inspect and overhaul it at frequent intervals, yet those who accept these conditions in the locomotive, seem to feel that with a commercial car the same care and attention would indicate in it a weakness. A commercial car should be just as carefully inspected each day, oiled, grease cups screwed down, adjustments maintained and other details attended to, as with a locomotive.

Every possible means of knowing exactly what is done with the machine on the road should be employed. Drivers

are prone to overspeed, overload and otherwise abuse the truck, and the owner who has operated machines for a short time soon learns that his money is well spent in any device which will properly safeguard his investment.

WEAK POINTS IN A. A. A. COMMERCIAL CAR CONTEST RULES

The American Automobile Association has recently supplemented the 1911 contest rules by a new set for commercial car competitions. This action is in keeping with the spirit of progressiveness of that organizaton, but there are certain features of these rules which we believe should be amended. In their present form they make it possible not only to exclude many well known commercial cars from competing at all, but also give an opportunity for a disgruntled official to do an injustice to a competing car.

In the first place we take exception to the wording of the definition of a commercial vehicle. The definition as given in the rules is as follows:

"A four wheeled vehicle designed and built for any, other than private passenger service, propelled by self-contained mechanical means, fitted with at least two brakes operated independently of each other, and a motor driven reversing mechanism."

This definition at once excludes any commercial vehicle having more than four wheels or less than four. Some commercial vehicles have six wheels, notably road trains, and there are trucks on the market which are provided with a fifth propelling wheel. Three wheeled commercial vehicles, of which there are already quite a number on the market, and which are growing in popularity for light delivery service, are also excluded, and according to this definition cannot even be considered as commercial vehicles. The question might naturally arise, What are they?

The definition further states that a commercial vehicle must be fitted with at least two independently operated brakes. It is a well known fact that there are large numbers of successful small and medium sized commercial cars, in which there is but a single set of brakes, one on each rear wheel, and these do not work independently, but are operated simultaneously by a single control lever.

Under the heading "Road Regulations" the following paragraph is found:

486. Entrants and official representatives of entrants shall conform to all laws, ordinances and rules of the road, and any entrant or official representative of such entrant violating any of the provisions of these rules, or who shall fail to show due consideration to the officials or other participants in the tour, or other users of the highways, may be disqualified or penalized at the discretion of the referee.

We take exception to this regulation on the following grounds: a contest or competition of commercial vehicles is presumably for the purpose of determining their relative merits; under this ruling, if the referee felt so disposed, he might heavily penalize any contestant who had not treated him with proper or due consideration, or who had shown that he was not properly disposed toward other contestants or users of the highway. We believe that the referee should have the right to disqualify a driver who does not follow the regulations, or who does not show due respect to those in charge of the contest, but we do not see that he has any right to injure the record of the car itself by penalizing it, when its performance might be as good as that of any of the competing vehicles.

The results of such contests are widely used in advertising and very few people know exactly why the score of certain cars is low, naturally taking it for granted that the performance of the car in question was inferior to that of the other competing cars. It will readily be seen that such a regulation might therefore considerably injure the reputation of a maker, if his car happened to be in the hands of an ungentlemanly or hot-headed driver. Where disregard of the rules would give a competing car an advantage over the other contestants, penalization could not be objected to, but as the contest is to determine the worth of the vehicle and not a record of the conduct of the driver, a car certainly should not be penalized when its performance is unquestioned.

It would seem that there are plenty of other ways in which the drivers of competing cars can be made to conform to the regulations and show due consideration to highway users, other contestants and the officials, without reflection on the good name of the car itself. We trust this matter will be carefully looked into by the American Automobile Association and these particular regulations and definitions be so amended that there will be no opportunity to exclude or in any way injure the reputation of any particular machine.

MOTOR VEHICLES FOR MILITARY WORK

Not only this government, but those of European nations, are watching with intense interest the military experiments with motor cars which have been a feature for several years of the work at the Northwestern Military Academy, near Chicago.

Major R. P. Davidson, the commandant at the academy and the originator and director of the various experiments, announces that during the coming summer it is his purpose to test out the utility of motor cars in the work of the signal division.

The two Cadillac machines which have figured in carrying out the ideas of Major Davidson and his students are to be fitted with bodies especially adapted to the new service. They will have telescopic masts, bearing antennae wires, whereby wireless messages can be transmitted over distances ranging from 50 to 60 miles. Should it be necessary to send a message farther, small balloons have been provided as part of the regular equipment of each car. These little gas bags were especially made in France, and with their aid the antennae wires are carried to any height, making it possible to transmit messages from 300 to 500 miles.

The United States Government is giving the Northwestern students every possible assistance in carrying on their work, the officials at Washington finding that most of their ideas are possible of practical utilization in the military operations of the regular service.

It is estimated by the leading solid-tire manufacturers that there are about 20,000 commercial motor vehicles in use in the United States. There are about 150 manufacturers engaged in building motor vehicles of various types designed for utility purposes. Taking $2,000 as the average value of each vehicle, which is a very conservative estimate, the outlay represents an investment of $40,000,000.

A Co-operative Motor Delivery System With Central Warehouse

BY CHAS. C. JAMES, NEW YORK CITY

WE ARE in the era of scientific management. Cities, railroads, corporations, and stores are conducted upon principles which, though simple in themselves and in no way constituting a discovery, are for the first time applied on a scale of which we have not dreamed heretofore.

One of the last exploiters of scientific management is the United Stores Association of New York City, which, so its promoters assert, will by scientific management alone, save, and therefore earn, $7,000,000 a year.

Co-operative Buying and Distributing

This gain is to be effected by two things: co-operative buying and co-operative distribution—items which are of prime importance in marketing all merchandise, for which reason it must appear almost strange that these factors have not sooner been given the amount of attention warranted by their magnitude.

A glance at the plan of the new enterprise might give the casual observer the impression that it were based upon Utopian hopes rather than on hard-headed business sense; yet the ideas have been worked out carefully and are now clarified into explanations covering even the smallest detail. The plan is based upon the English co-operative system which has been in successful operation in the British Isles as well as upon the European continent for over fifty years. How far-reaching a concentration of the delivery facilities alone may become, is shown by the fact that the English company operates its own steamships, which ply between American and English ports, carrying to England such of the goods handled by the company as are made better or cheaper in the United States. The saving resulting from the shipping of whole cargoes at one time and the elimination of the profits paid to the steamship companies furnishes an illustration of what can be attained by a combination of purchasing power and distribution.

Of course the values of efficiency and economy are recognized in every well-conducted business, though in most cases they are, no matter how great in themselves, mere incidents of the business proper, whereas the co-operative system mentioned in the foregoing, finds in the factors of co-operative buying and concentrated distribution the chief elements of its financial success, which in most businesses are obtained principally by the factors of production and selling.

The Old Way, A Wagon From Each Store

It does not require great business acumen to see the advantages of shipping freight in carload lots rather than in small consignments, or of chartering a ship for carrying a shipload of goods rather than to transport your merchandise through a steamship company. In considering carload lots and ship loads, we deal in large figures and considerable items. But what about the small ones? What about the delivery systems of our towns and cities? What about the millions and millions of small packages of merchandise which are daily sent out by thousands of merchants? What about the waste of time, money and material by the unavoidable duplication in the present-day delivery service? Let to-day be your wife's shopping day. She will invest in a gown at Bluecap, Smith & Company, acquire a bonnet at the milliner's, purchase a boquet at the florist's, and, on her way home, she will stop at the butcher's to give instructions concerning the piece de resistance of to-morrow's dinner. In the afternoon you will behold the line-up of an imposing procession before your residence. There is the delivery wagon of Bluecap, Smith & Company—two horses, one wagon, one man and a boy. Your wife's Spring bonnet arrived in another vehicle operated in a similar manner. The florist, not to be outdone, delivers his goods in the style becoming his standing and that of his customers; and, last, though by no means least, there is the butcher's rig. And the result of all this formidable array of transportation facilities is the delivering of four packages. Now any one of those four vehicles and one-fourth of the human effort used up in handling four packages by four distinct sets of wagons, horses and attendants, would have done the work as effectively and at one-fourth the cost. The economic waste is plainly seen and it is not necessary to go into the question who bears it, for both seller and buyer are the victims of this system.

Cost By Present Methods

Nor is it difficult to prove that this state of affairs exists, for if you examine the delivery system of each merchant separately and ascertain the total cost of maintaining the system, and then take into account the number of packages delivered daily, you will find that in the majority of cases it costs from ten to twenty cents to deliver each package, depending upon the character of the goods.

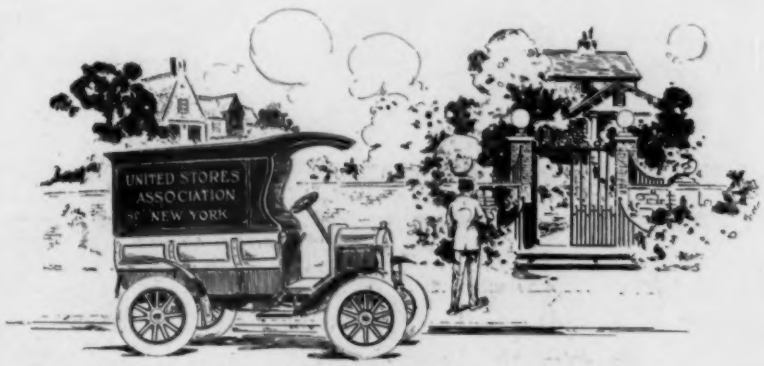
As stated in the foregoing, the plans of the United Stores Association of New York involve the fullest utilization of

every advantage to be obtained from a co-operative delivery system, for which reason the work in which I am at present engaged, of organizing a delivery system to handle the vast and diversified business of the Association most effectively and economically, is of more than passing interest.

The system will practically cover New York in supplying more than three hundred thousand families. Included in the membership are department stores, men's furnishing stores, grocery stores, hardware stores, fish depots, shoe stores, candy stores, butcher shops, milk depots, tailors, tobacconists, bakers, and a multitude of other lines.

Deliveries Made From Central Co-operative Warehouse

Now a superficial examination of this list by the delivery man might suggest the opinion: "not feasible." Let us see. The problem by which we find ourselves confronted presents several unique propositions, for in the list of stores we find such incompatibles as fish and milk, glass and hardware, furniture and flowers, tobacco and candy, eggs and lace. My first suggestion in the organization of the delivery system was, that each group of stores in the association, especially those who handle bulky goods, establish a centrally located depot as near the center of the area of delivery as possible, and that the association abolish the present custom of the dealers carrying large individual stocks and of making separate deliveries over exactly the same routes, of ringing the same door bell an unnecessary number of times, of permitting wagons and attendants to get in one another's way, with consequent loss of time at dumb waiters and entrances. It is not at all difficult to see the many advantages that arise from this plan, in which the stores are merely show places of samples and where orders will be filled not by the stores themselves, but upon requisition on a co-operative warehouse or depot, from which all deliveries are made.



The New Way, One Delivery for All

In such cases in which the customer purchases a definitely designated article at one of the stores, this would be turned over to the collection wagon of the co-operative warehouse which calls at each association store at regular intervals. As soon as the goods are turned over to the warehouse they are assorted and classified in accordance with character, bulk, and destination, and dispatched to their addresses on regular schedules. Specialists will be in charge of the service and in this manner every delivery will become, for all practical purposes, a special delivery.

In the assorting of the goods at a central depot it will be found, for instance, that Mrs. Brown and a number of other purchasers have in the course of their shopping made purchases from a number of stores in one group and that the goods can be dispatched in one or two deliveries, instead of in a half dozen wagons from as many different stores.

Customers who patronize a group of stores in a city like New York, in a given section of the city usually live in a circumscribed area. As a result it is not difficult to concentrate the delivery to the greatest advantage, to have such wagons cover a straight and regular route, with only short distances between stops. There is little or no dead mileage, the one thing that makes delivery so expe sive a proposition for many stores. The whole delivery system is based upon the idea of scientific management, economy and efficiency.

The volume of the business done by the United Stores Association is so great that we may confine our compatible goods to certain wagons and still send out every wagon loaded to its full capacity.

Three Hundred Packages Per Day Per Wagon

A short time ago one of the largest department stores in New York City adopted automobiles to do delivery work and proved that a driver with a helper can deliver from two hundred to three hundred packages daily, the exact number depending upon the character and bulk of the goods transported. Extensive as is the business of the department store in question, it is not so great as to include in its service many customers in the same street or in one apartment house as does the volume of business possible under the United Stores Association organization. In spite of this handicap the motor-car delivery system has proved so successful to the store in question that a return to the old-fashioned, horse-drawn delivery service is absolutely out of the question.

In the inauguration of a system of this kind it is, of course, of great importance to make certain to have the equipment of a flexibility that will accommodate itself to the varying demands necessarliy made upon it, in a business including so many different lines. Automobile engineers have given these conditions much thought, and, after years of experimentation, have solved the problem in a very satisfactory manner. In the motor car the items of load, speed, road conditions number of stops and starts, bulk of goods, and total distance traveled, have a much more important bearing than may be discovered in horse-and-wagon delivery, since they go to determine not merely the horse power of the motor, but the character and construction of the car.

The motor delivery service of any large business or combination of businesses should be conducted under the supervision of a practical automobile man, and as a separate branch as far as accounting is concerned. In other words, you should know exactly what it costs to make a delivery and enjoy the full efficiency of the equipment.

Present Development Foreshadows the Future

The present development of the co-operative-delivery idea only dimly foreshadows what the future will bring

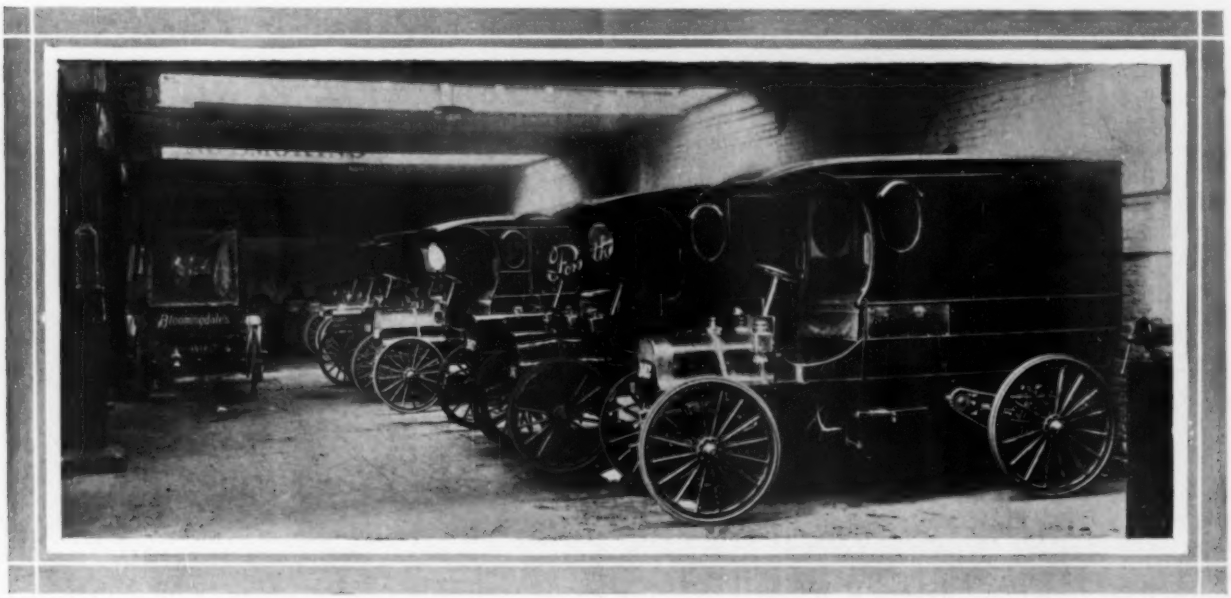
forth. The motor car, which is playing so conspicuous a rôle in transporting the individual, will become of even greater influence in revolutionizing the methods of transporting the innumerable things needful for human subsistence and comfort. After all, the chief problem of merchandizing is not the mere production, but distribution. For great cities there is nothing in connection with merchandise distribution that will make for greater strides toward rapid improvement than the shortcut of motor-car delivery. Nor does it require prophetic vision to foresee events. The conditions are here and means are taken everywhere to meet them in the best way in which they can be met.

Guaranteed Commercial Car Delivery

BY E. S. FOLJAMBE

PERHAPS the uncertainty attendant upon the installation of motor trucks for delivery work, especially as regards the cost, has as much as any other one cause, deterred business men from adopting up-to-date delivery methods. A new thing, untried, therefore uncertain as to the ultimate expense involved, is always avoided by the conservative business man. Although it is generally well known that commercialcars can operate more economically than horses, or under the worst conditions at a cost but slightly in excess, still there are specific cases of mismanagement, insufficient equipment and abuse which have totaled prohibitive figures, thus serving as a scarecrow.

with the assurance that back of them an organization stands ready with extra vehicles and parts to make good any defects, and transfer the load and deliver the goods in case of serious breakdowns. The merchant is freed from the anxiety and expense of insurance against accidents, injuries, etc., incurred on the road. He does not have to keep a garage, or in any way be harassed with the minor details of the care of the delivery wagons. All the responsibility and uncertainty is shouldered by the company supplying the guaranteed delivery service. Several instances of this kind of work have from time to time come to the attention of the writer, the present one being that of the Rockwell Motor Transportation Company, 518 West Thirty-seventh Street, New York City.



Rockwell Motor Transportation Company's Cars

This company maintains a guaranteed motor delivery service at a set figure per month for a year. Some of the Chase cars now in daily operation in New York City are here shown

Guaranteed Service

When, however, a guaranteed high class service at a fixed weekly rental is the proposition before the merchant, the "bugaboo" of unknown cost is eliminated. With a proposition of this kind he feels that he is dealing with entirely known conditions and is relieved of the responsibilities and the uncertainty which accompanies the use of, to him, a new and untried mechanism. In fact everything is in his favor. Under the guaranteed service method, trucks or delivery wagons with uniformed operators are regularly at his disposal

This company carries on a delivery service for merchants having light parcel delivery requirements, for a fixed rate per week, based upon daily mileage. It supplies the car with uniformed driver, does all repairing, garaging, etc., and maintains extra vehicles to do the work in case of trouble; also puts the name of the company on the machine in gold letters or on a plate, so that to all observers the machines are manned and operated by the respective concerns themselves. The charge for this service varies between $50 and $75 per week, but the cost for packing is from 15 per cent. to 50 per

cent. less than the service of horse wagons, electrics or express companies. The company served is called upon to supply a helper, usually a young man capable of taking care of collections on C. O. D. packages.

The classes of merchants supplied are: Retail stores (not including department stores), clothes, cloaks and suits, florists, book companies, caterers, shoe stores, milliners, etc.

The charge is based on mileage, as the cost of operation due to overhead expenses, such as garaging, insurance, depreciation and help in the office are more or less constant, the mileage charge taking care of the items which are directly affected by distance traveled such as gasoline, oil, tires, etc.

This company gives some interesting information as to how many horses and wagons a motor delivery wagon is able to displace, and shows that this is entirely dependent in parcel delivery work, upon the portion of the city in which deliveries are made. Traffic conditions and the patrons to whom goods are delivered, differ so widely in different sections that where the same wagon might be able to do the work of three horses and wagons in one section, in another it could not accomplish more than one and a half times the work of a horse and wagon. The districts might roughly be divided into tenement districts, apartment houses, hotels and private houses. Of these the apartment houses and hotels, especially the apartment houses, are the worst, as far as taking up time is concerned. For example, at many apartment houses the driver must go to the servants' rear entrance, being compelled to pass through an alleyway, sometimes over pipes, around barrels, etc., and is often called upon to walk to the third or fourth floor; he rings the bell, the lady comes to the door and says, "O, yes, here is my dress from John Doe's." She must immediately retire into the next room to try it on and then ask her neighbor across the hall how she likes it before the money is paid over, twenty minutes thus being wasted.

The state of traffic must also be reckoned with. Above Forty-second Street, in the hotel and apartment house district, traffic is so open that it need not be considered. Below Forty-second the traffic becomes a factor and from downtown up to Twenty-third Street traffic is so congested and moves so slowly that a machine cannot do more than one and a half times the work of a horse rig of the same capacity. Above Twenty-third up to 110th Street the motor delivery wagon is equal to two horse wagons, while above 110th Street up to 200th the work of three horses and wagons can readily be taken care of. In the Bronx, north of the Harlem River to Fordham Road east and west, it is almost impossible to compare motor trucks with horses and wagons, mileage being about the only thing that can be used as a basis. In this district a wagon will travel perhaps fifty miles and not make over forty-five stops. Of course such distances are out of the question for a horse. Trucks on this route leave the garage at 11 A. M. and return about 8.30 P. M., and twice as many packages could be delivered if required in a very slightly longer time.

All suburban cars and cars delivering above 100th Street in Manhattan, that have more than 125 stops, east and west, make but one trip a day. However, over the same territory two trips a day can be made if not more than thirty or forty deliveries are made on each trip.

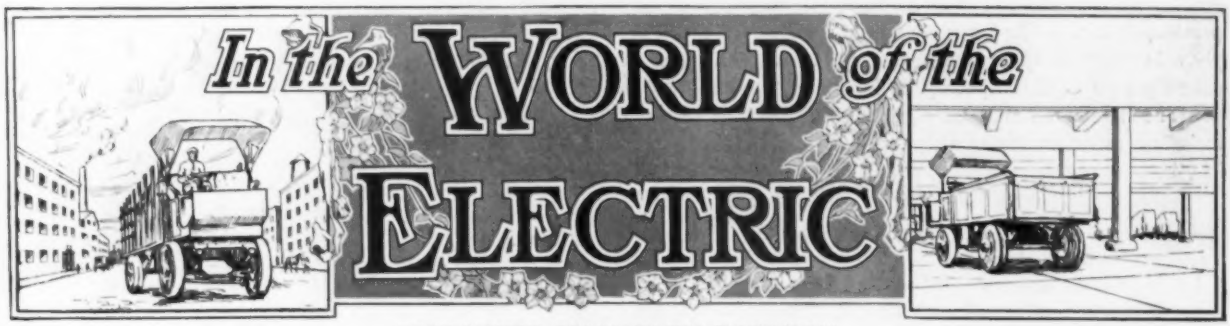
The Equipment

The present equipments of the Rockwell Motor Transportation Company consists of seventeen Chase cars of from one-half to one ton capacity, all on solid tires. This equipment is particularly interesting owing to the fact that the motors are of the three-cylinder, air-cooled, two-cycle type, which is believed by some to be the future type of motor for low and medium priced commercial cars. These cars each average about forty-five miles per day, some going as low as thirty and others as high as sixty miles. They make about twelve miles to the gallon, and some machines for a period of over a month have averaged as low as seventeen miles to the gallon when covering long runs to New Rochelle and the Bronx. Practically no engine troubles have been experienced, and the big wheels are said to be easy on tires. At least one car is kept in reserve for use in an emergency. This car, however, for a month and even two months at a time, has not been called upon. In such a business the chief factor is of course the delivery of the goods, and to show how quickly a breakdown can be taken care of when it does happen, the following instance may be sighted. One afternoon at 4 o'clock a telephone message was received at the garage, that car No. 14 was disabled in Bronxville, about eighteen miles from the garage. The emergency was hurried to the scene, and by 6 o'clock was on her way delivering the goods. The wrecked machine, which had hit a tree, was fixed on the road and driven back under its own power.

About every four months which represents a running of about 4500 miles, the cars are laid up for an overhauling, and during this period the body is usually varnished, as one feature of the service is maintaining the equipment in first class condition, so that both cars and drivers make a creditable appearance, as the company does not cater to low standard trade.

The drivers do not repair or overhaul the machines, but simply make minor adjustments as may be necessary on the road. A suitable repair force and machine shop is maintained for the thorough overhauling of the equipment. The drivers have been largely recruited from the ranks of the helpers, this system working out well, as it gives the helpers a personal interest in the work with the prospect of learning to operate and eventually handle a car themselves.

The Rockwell service was instituted with one car in November, 1909, and since that time has grown steadily with one or two machines added at a time until the seventeenth machine, recently purchased, completed the present equipment.



CONDUCTED BY HARVEY ROBINSON

MONTHLY MEETING OF ELECTRIC VEHICLE ASSOCIATION

The regular monthly meeting of the Electric Vehicle Association of America, was held April 25th, in the Engineering Society's Building, 29 W. 39th Street, New York City, with C. A. Littlefield presiding in the absence of Mr. Blood. An increase in membership of 29 during last month was reported bringing the membership up to 181. It was also announced that the Association will hold a large electric vehicle parade during the period of the National Electric Light Association convention in New York, as at that time representatives from central stations from all parts of the country will be in the city. Tentative dates May 29th to June 2nd.

The paper of the evening was by Mr. Lanphier on the Ampere-hour Meter for Electric Vehicles. Mr. Lanphier in his answers to questions which were brought up in the discussion showed an exhaustive knowledge of the subject. Some of the points brought out in the discussion were as follows:—

Effect of temperature on the Ampere-hour Meter. From a normal temperature of between 80 and 75 down to 30 or up to 115 the error due to temperature in the shunted size, is well within commercial limits, as it does not exceed plus and minus 4 per cent. from that range at any given point. The Ampere-hour Meter is to be handled by the garage men only, the driver having nothing to do with it. In pleasure car service a woman operator can tell from the position of the hand on the Ampere-hour Meter whether she can get home or not. Mr. Lanphier sees no necessity for using an ammeter and voltmeter in addition to the Ampere-hour Meter, believing that the most desirable place for the ammeter is on the charging board. Ampere-hour Meters are usually built to run correct on discharge and slow on charge, this being the method recommended by the makers.

ALL TRUCKS LOADED INSIDE THE STORE

A large and well known jewelry store in New York City has now in use 21 General Vehicle Company's electric wagons, all fitted with Edison batteries. A peculiarity of their system of using the machines is the fact that no goods are handled on the street. The trucks, being electric, pass directly onto a large 23 ft. electric elevator, and are lowered to the basement under the main floor of the store. Here they are loaded with their valuable parcels and locked before being returned to the street. This company started to use electrics in 1902, and four years ago sold the last horse and wagon. It is estimated that one auto does the work of three horse wagons. The vehicles cover a range of from 65 to 70 miles from the store, and are so satisfactory that a return to horses would be out of the question.

TO PROMOTE THE ELECTRIC VEHICLE

As an incentive to further the electric vehicle business in Boston and vicinity, the Boston Edison Company has announced at its last conference that it will purchase $100,000 worth of vehicles for its own use. At this gathering forty electric vehicle representatives and members of the above company were present.

Following the dinner W. H. Atkins, general superintendent of the Boston Edison Company, opened the discussion. He emphasized the necessity of team work and the necessity of all those engaged in the business keeping in touch with the latest developments. To accomplish this he suggested the holding of a short weekly meeting and luncheon on a day most convenient for the majority. This would give an opportunity for a full, free and timely discussion of the conditions as they develop. He said that if this plan was agreed to they could all meet in the Edison building and the luncheon would be furnished by the Boston Edison Company. Before Mr. Atkins finished his remarks as presiding officer of the evening he had emphasized the fact that the Boston Edison Company, while not wishing to make the error of trying to do the whole thing itself, proposed to do everything in its power to assist the electric vehicle dealers. The company is buying a large number of cars and proposes to distribute the orders for these among the Boston representatives of electric vehicles according to their merit and push. Addressing the representatives he said. "It is up to you, gentlemen, to advertise the specific vehicles you want to sell. This will be your kind of advertising and pushing. We will advertise to popularize the industry and will show our faith in it by buying $100,000 worth of vehicles for our own use."

A sum of money has also been given to the Massachusetts Institute of Technology to be used for prosecuting investigations of electric vehicle questions. Committees have been appointed as follows: Electric Advertising signs, Day Baker, General Vehicle Co., chairman; Conferences, A. F. Neale, Baker, chairman; Co-operative Advertising, C. F. Redden, Studebaker, chairman; Charging Stations, J. Walter Emery, Walker Balance Drive, chairman; Rates for Charging, F. A. Daly, Babcock, chairman; Information as to Prospective Customers, W. E. Eldridge, Couple-Gear, chairman.

Mail Distribution by Electrics in New York City

THE motor distribution of mails in New York City covers only the portion of the Greater City lying north of 42d street. This is served by twenty-eight electric wagons of the General Vehicle Company make, comprising seventeen 1,000-lb. wagons, five 2,000-lb. wagons, four 2-ton trucks and two 3½-ton trucks. The combined mileage of these vehicles reaches, on the average, 1,150 miles a day. The tabulated list below gives the record of these vehicles for a typical month last fall:

1,000 lbs.	21,787 miles
2,000 lbs.	9,238 miles
2 tons	2,724 miles
3½ tons	952 miles
Total mileage of 23 machines for month of August, five of the machines being kept in reserve the entire month	34,701 miles

The smallest number of wagons used at one time is five during the night, and the usual number in operation at one time is from five to fifteen, and these make an average speed of nine miles an hour. All are run on a railroad schedule, each machine running about 4½ hours, and the batteries are never allowed to become thoroughly exhausted.

No exact figures are obtainable as to the saving effected with these vehicles over horse delivery, but a very conservative estimate places the saving as over $1,000.00 yearly. This new service superseded the handling of the mail via the Third Avenue R. R., with a messenger delivery system between their stations and the different branch post offices, for which, of course, horse service was used.

The following schedule will give a very good idea of the precise nature of the service by the motor vehicles. The routes are given in both directions, and a "trip" means a run one way only. The term "trip" is understood to cover all mail to go at one time from one point to another, whether one or more wagons are necessary to transport the mail. When several dispatches are made at the same time and can be carried in one wagon, the transfer is considered a trip. The total length of the East Side circuits, one way, is 9.89 miles, and that of the West Side circuits 9.20, or slightly more than 19 miles in all. The running time allowed means the actual time in transit; the time for loading and unloading is not included. The running time is made to conform to the limit allowed by local ordinance.

	Distance Miles	Number of Trips Daily Except Sunday	Number of Trips on Sunday	Total No. of Trips a week	Running Time Min.
Circuit No. 1—					
Route 1	4.37	12	7	79	31
Route 2	4.37	11	6	72	31
Route 3	5.32	1	1	7	39
Circuit No. 2—					
Route 1	3.57	12	6	78	23
Route 2	3.57	12	6	78	23
Route 3	1.00	10	6	66	7
Route 4	1.00	10	6	66	7
Circuit No. 3—					
Route 1	6.00	2	2	14	45
Route 2	6.00	2	2	14	45
Route 3	6.00	11	7	73	45
Route 4	6.00	11	7	73	45
Circuit No. 4—					
Route 1	3.20	34	12	216	23
Route 2	3.20	34	12	216	23

Postmaster Morgan, upon the publication of a short article in a New York paper, stating that New York had no motor mail equipment while Moscow has, wrote immediately to contradict the statement. His letter throws still further light upon the use of motors in mail transportation, and is given in part below.

"Motor driven mail wagons were first introduced in this city on July 1, 1909, and are still in operation. This motor wagon service is used in connection with the supply of stations above 42d street as far north as Washington Bridge on the West Side of the city, and Tremont on the East Side of the city; the machines are of electrical type, and of a carrying capacity of 1,300, 2,500 and 4,500 pounds respectively, in addition to which in emergencies, such as the Christmas holiday conditions, etc., there are introduced into the service electric vehicles of a carrying capacity of 7,000 pounds.

"When the pneumatic tube service was extended on the East Side of the city to station L, at 125th street and Lexington avenue, the motor wagon service between the Grand Central Post Office station and that point was somewhat reduced because of the extension of the pneumatic tube service.

"There is approximately a half hourly motor wagon service on the West Side of the city between station J at 124th street and Eighth avenue, and Stations College, Hamilton Grange, M and Washington Bridge, and on the East Side of the city between station L, at 125th street, and Lexington avenue and stations X, R, T, Fox street and Tremont.

"The motor wagon service in operation between 42d and 125th streets on the East and West sides is supplemental to pneumatic tube service, which supplies all stations embraced within that territory, and the former therefore does not require to be of the same frequency as that above 125th street.

"From this you will observe that motor driven mail wagons form a very important part of the transportaion service of this office."

THE NEW YORK EDISON COMPANY, one of the largest individual users of electric commercial vehicles in this country has purchased five 1,000 pound load capacity Baker electric delivery wagons for use in New York City.

P. D. BEACH, who for the past ten years has been traveling in Ohio, Indiana and Kentucky for the Consolidated Rubber Tire Company, has been appointed assistant manager of the Cleveland branch, located at 1846 Euclid avenue.

Meeting the User Half Way

HOW THE MAKER MAY IMPROVE CONDITIONS

SOMEWHAT complex is the commercial car situation, at present due to various causes and whether it is to remain such or improve depends to a great extent on the manufacturer. To dispose of cars in the near future will doubtless be more of a proposition than heretofore, owing to keen competition as well as other reasons. It is a safe conjecture that present relations between the producer and the consumer are not quite right. There is reason why the two should know and understand each other, there will be better feeling by reason of that understanding. New makers constantly coming into the field will result in keen competition which, in itself, is not a bad thing.

The manufacturer produces the cars, but, it is the consumer who demonstrates that the car is good, or otherwise, and the need for the most satisfactory relations between the two factions is now more urgent than ever.

There was a time in the pleasure car production when certain makers were prone to a decided stand on construction and the like, and if the public did not take a fancy to what was offered, why go without it, but, there was no necessity for going without it when the other fellow alive to the situation offered just what was wanted. Commercial car manufacturers must look to the consumer, not that he must be patted on the back but simply considered in the right light, that is all. It is well within reason to assert that there are those builders and their agents, who, once having closed a sale, have held aloof thereafter. No effort was made to ascertain the quality of the service derived, and the result was hardly one to put the maker in the right light. If a builder has enough faith in his product to invite public confidence he must have some method of taking care of the customer after sale, either throughout branch houses or agents or through traveling trouble men or missionaries.

Experienced User the Public Demonstrator

It is the experienced user who has learned just what a car can do who serves the public in quest of information on this up-to-the-minute method of transporting goods. He proves for the maker the value of a given construction which may have been figured out to be theoretically correct and his work is taken more seriously by the public (who are inclined to be skeptical) for his efforts are to accomplish more and better work that means increased returns. And it is because in the transaction of his business he proves this or that that the producer cannot ignore him. It makes little difference to some users of commercial cars if a factory man never drops in for a friendly call, they have sense enough to get along without his aid. But how much better if the maker would take the trouble to "meet the consumer half way," help him over the rough spots, especially if motor truck delivery is new to him.

Inexperience Must be Considered

By reason of the fact that the bulk of the commercial car business in future will come from the so called uninitiated there is more urgent reason for the cultivation of most harmonious relations between the makers and the users. Discarding horse entirely and adopting motor trucks they will have many things to learn, and the maker may help materially. The manufacturer cannot morally terminate his responsibility to the purchaser after the sale of the car; he must keep in touch with that user who may be making vital mistakes. It is not a paying proposition for a maker to allow him to continue with unsatisfactory results, for the one thing

Packard MOTOR CARS

Standard Auto Co.

Boulevard and Garfield Avenue
Detroit, Mich.

No. .....

Time ..... Motor No. ..... Date .....

Inspector's Report:- Owner

Motor	
Cooling System	
Oil Levels	
Ignition System	
Governor	
Steering	
Clutch	
Universal Joints	
Transmission	
Chains	
Sprockets	
Brakes	
Springs	
Remarks	
Odometer Reading	

Inspector .....

Inspection Blank Used by Detroit Packard Agency

the public will bear in mind is that the car did not give servise, notwithstanding that it was fully capable, but mismanaged. Public opinion is a harsh critic.

Where the Trouble Man Comes in

This is where the trouble man comes in: A car may be doing badly 2,000 miles from the factory, and the nearest agent may be some distance from the user. It is the custom with many pleasure car builders to maintain a trouble or missionary force and they have accomplished much. The same holds true in the commercial field. The trouble man knowing the construction thoroughly ascertains in a very short time just what is wrong, and it does not take him long to correct the fault, and he rectifies the wrong and the user

is satisfied. A few moments of earnest instruction will bring about good results in nine cases out of ten. Commercial cars are dollars and cents to the users, and the more earnest the effort of the factory to assist the user in maintaining service the better. The trouble man is a money saver for the producer and the consumer, for in the correction of a fault he benefits both parties.

Field Reports Essential

The manufacturer through various branches and agents may keep well informed on the work of every car sold, and in this way there is a record of performance. If, from reports, the maker is certain that results are not what they should be, if the agent cannot adjust the difficulty which he ought to be able to do, then the trouble man can assume the responsibility. Field reports constitute a link in the chain between the consumer and the producer.

Maker Must More than Guarantee Car

That the maker must more than guarantee his car is certain. He can through his organization one way or the other provide the user with a lot of sensible information which assimilated by the user spells "improved service," and improved service means increased revenue which translated, means more future business for that maker. In such cases where purchasers are unfamiliar with the commercial car, having set aside horses in accepting the modern method, the maker can do much for the user and himself by demonstrating the value of a careful system of care and repair. Incidentally the men selected to operate the cars can be taken in hand and schooled, and good results are sure to follow.

Value of Service Departments

The value of the service department is generally conceded by makers, and these are increasing and will continue to. The service department is a step in the right direction; it is the one assurance that the purchaser is to be cared for after he has bought his vehicle. Various factories now maintain these service departments throughout the larger cities. In such instances a user is provided with another car, if for any reason his own has fallen by the way.

The manager of the Cleveland branch of one of the most prominent makers offers the suggestion which has been adopted by that maker that instead of supplying an additional vehicle which simply means a shifting of the load from the dead to the live car, let the broken part be substituted by another. The work under ordinary circumstances with proper equipment can be done at the roadside without difficulty, and with the new part in place the owner can then go his way without unnecessary loss of time.

An Example of Consideration

Makers are considering the subject seriously, a case in point being the R. L. Morgan Company, at Worcester, Mass., one of the first American concerns to engage in motor car construction. A system has lately been put into effect whereby the owner of a Morgan truck is closely observed after purchase. The driver of the car is schooled in Morgan truck construction at the factory, and at the conclusion of the session he is given the following list of questions to answer. This examination paper embraces various features of the construction and the driver must know the cause and the remedy of ordinary troubles.

1—What trucks have you operated?
2—How long?
3—Where?
4—For whom?
5—What is carbon?
6—Where will deposit of it be found and how detected?
7—How is it to be removed?
8—What may cause an engine to back-fire through the carburetor?
9—What may cause an engine to skip explosions?
10—How should push rods be adjusted?
11—How should valves be ground, i. e., what is the operation in getting a perfect seat?
12—What is meant by advance and retard spark?
13—What does black smoke issuing from the muffler mean?
14—What does white smoke issuing from the muffler mean?
15—What causes the engine to heat?
16—What will short-circuiting of ignition do?
17—How should you tighten the clutches, low speed and reverse?
18—How would you tighten the high-speed clutch?
19—How would you tighten the foot-brake?
20—In case of slack drive chain, what would you do?
21—What causes slack of chain?
22—How do you tell when engine is running on three or fewer cylinders?
23—Suppose you break a chain and decide to go home on one chain, what would you do?
24—How would you adjust the radius rods?
25—What kind of anti-freezing solution do you prefer?
26—How do you mix it?
27—How often should it be put in car?
28—Where would you put it—engine or transmission?
29—How often should countershaft be lubricated?
30—Should it be lubricated with grease or oil?
31—How often should wheel bearings be lubricated?
32—With grease or oil?
33—How often do you fill engine reservoir with oil?
34—How do you know when it is filled?
35—Name oil holes and grease cups on engine.
39—Name vital oil holes and grease cups on transmission and countershaft.
40—How often should they have attention?
41—What cylinder oil do you recommend, i. e., as regards fire-test and viscosity?
42—How often should you fill radiator?
43—How often should you lubricate steering knuckle pin and with what?
44—In case you have to stop car in emergency, what would you do?
45—Do ball bearings need any oil?
46—When cranking car to start would you advance or retard spark?
47—If the engine does not start easily in the usual way, where would you look for the trouble?
48—In making extended stops would you leave engine running or stop it?
49—In coasting down grades would you pull control lever into first or second neutral?
50—If engine, while running, fails to stop when throwing off switch, what is wrong?
51—If you disengage high-speed clutch and car fails to respond, what is wrong?
52—What would you do in that event in the case of emergency stop?
55—What is the remedy?
56—Can you distinguish a piston-ring knock from a bearing knock?
57—A. How would you locate a knock in engine? B. What is the first thing you would do if you detected a knock in the engine? C. What will happen if not given immediate attention?
58—When should you race the engine?
59—How do you race the engine?
60—What happens when it is raced idle?
61—If you were out on the road and had a connecting rod bearing go bad, how would you get home without calling for assistance?

62—What is the maximum speed at which you would operate a 5-ton truck?

63—How would you adjust carburetor to get best results?

64—In driving on level road how would you carry your spark?

65—When engine is working at its maximum capacity and "pulled down" to the point of laboring how would you carry your spark?

66—How would you start a load from a standstill?

67—What happens when the road wheels are thrown out of line?

68—When running on magneto what would you do to correct missing which you know to be due to faulty ignition?

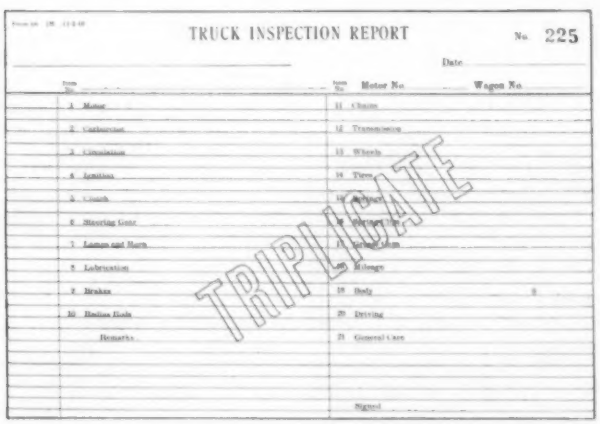
69—When driving on wet pavement how would you avoid skidding?

70—If car should start to skid what would you do?

71—What happens when you run with a low spark and open throttle?

72.—Describe how you would treat driving chains to insure long life.

Then too, as a means of assisting the owner of the vehicle the Morgan company has evolved an inspection blank or daily truck report. The sheet is ruled to receive the date, number of car, inspector, and the mileage of the vehicle. The report is classified according to motor, transmission, running gear, clutch, steering gear, brakes, wheels, fuel and cooling system, ignition, lubrication, with a list of points where the vehicle should be thus cared for, the final classification being miscellaneous under which the inspector is to report the pulling power of the machine and the like. On the last page of the document are instructions for the inspector for the use of the accounting department. The report suggested would cite material received from the stock room, material used, new material, and parts returned to stock, broken or defective material returned to stock room, time to be charged, and general comments. The intention here is


TRUCK INSPECTION REPORT No. 225

Date

Item No. Motor No. Wagon No.

1 Motor
2 Carburetor
3 Transmission
4 Ignition
5 Clutch
6 Steering Gear
7 Lamps and Horn
8 Lubrication
9 Brakes
10 Radius Rods
Remarks

11 Chains
12 Transmission
13 Wheels
14 Tires
15 Axles
16 Springs
17 Frame
18 Mileage
19 Body
20 Driving
21 General Care

Signed

TRIPLICATE

Inspection Blank Used by Chicago Packard Agency

to suggest a form of inspection report that will ensure thorough attention to every detail of the truck. The suggestions on lubrication are most comprehensive. The need of something of this sort was realized for some time.

PACKARDS IN THE DETROIT POLICE SERVICE

The Detroit Police Department has issued a statement bearing on the use of Packard motor patrols in the police service for six months from October 1, 1910, to April 1, 1911.

"The installation of Packard automobiles in place of horse-drawn patrols has been remarkably successful in this department," says Police Commissioner Croul. "During the six months we have shown a saving of $7,112.51 in favor of the automobiles, and in addition we have derived almost endless benefits on account of the greater speed and distance the automobiles travel."

Below is given an official summary showing the work performed by the seven Packard motor patrols in the period mentioned, and the cost as compared with the horse patrol system.

Number of calls responded to, 13,353; number of miles traveled, 34,386; emergency calls involving removal of injured persons to hospitals or homes, 719.

Expenses October 1, 1910 to April 1, 1911:	
Machinist	$ 400.
Oil	610.30
New Tires	167.48
Repairs on Tires	150.20
Other repairs	717.51
Total	$2,045.49

These motor patrols have replaced thirty-six horses, ten patrol wagons, twelve patrolmen and two hostlers. To maintain the service with horse-drawn vehicles would have cost as follows:

Care of thirty-six horses	$1,998.
Pay of twelve patrolmen	6,000.
Pay of two hostlers	660.
Repairs to ten patrol wagons (approximately)	500.
Total	$9,158.

This figure compared with $2,045.49, the cost of maintaining the motor patrols, shows a balance of $7,112.51, which represents the saving effected by the use of automobiles during the six months' period.

In the table showing the cost of operating the motor patrols no reference is made to crews, as the cars are manned by patrolmen in the regular service of the department. In making the comparison, twelve patrolmen are listed in the second table as additional men whom it would be necessary to employ in order to perform the same service with horse-drawn vehicles.

The Commercial Vehicle Tire

BY K. S. MARTIN

PON the development of a serviceable tire combining the necessary qualifications of resiliency, durability and safety and such desirable features as ease of attachment and repair, depends in a very great measure the ultimate success of the commercial vehicle.

Business and Pleasure

Those who direct the energies of business in whose routine the service motor finds a place usually operate pleasure cars and are therefore more or less familiar with the type of pneumatic in general use on this class of vehicles and accept with equanimity the replacing of a damaged tube or shoe and in fact expect their share of what they are pleased to term "tire trouble." Let, however, their truck driver or foreman suggest the need of a new set of tires for the business car or for the repair of an injured section and the occasion is made use of for a discourse on the prohibitive cost of motor haulage and on the rottenness of heavy tires in general and those of the make he is using in particular. Then either a meager allowance is made for this phase of maintenance or the man is sent back to do what he personally may to relieve the situation, and so the truck goes out again, serious trouble rapidly develops, the entire mechanism is terribly racked, and probably put entirely out of commission and auto transportation condemned except in so far as its advertising value is concerned. What, in the official's mind, was in one instance a perfectly legitimate and necessary replacement now becomes a largely looming item of entirely uncalled for expense, and this is perhaps especially true of the user of solid tires, who can see no reason why such a seemingly stable and rugged construction can wear away and suffer from misuse, and this lack of knowledge exhibited lies largely with the tire manufacturers. Their past policy has never, to any extent, been one of attempting to educate the users of their product to an appreciation of the tremendous difficulties that have been surmounted in arriving at the present state of efficiency, of the endless experimentation and disheartening setbacks that have fallen to the share of the tire engineer in his efforts to place at the disposal of the public a perfect product.

Construction

The tires of pleasure cars, and by this is meant those of the pneumatic type, wear out more or less evenly around the tread, down in many cases to the woven carcass and can then, if the shell still be in fair condition and not severely ruptured, retreaded and again be used. In the case of the solid tire, however, this desirable feature was, until a short time ago, lacking, and in numberless instances the solid tire was cut and chipped instead of being worn away, the injuries being of such a nature that the base of the tire represented and could be claimed only junk.

This condition of affairs was due to the different way in which the two types of tire were held to the metal rim and the way in which shocks were absorbed and transmitted and strains were taken up and directed. The pneumatic tire absorbs an obstacle and by deforming locally places a portion of its burden on every molecule of air in the tube, each taking its share of load. The solid tire however, has to do its work at the point of attack, it cannot make the entire structure share its trouble, and the composition in the immediate vicinity of the affected area receives the entire force of the shock.

In the greater number of pneumatic tires the air pressure is relied upon to a great extent to maintain the shoe in place. In the solid tire the fastening must be entirely mechanical and the great difficulty has been to transfer the strains imposed from the tire structure to the retaining metallic members. This has not, until recently, been accomplished with any degree of satisfaction. Any construction whereby there is incorporated in the main body of the tire any holding parts or where the tire comes in contact or is held by any flange or wire, causes deterioration. The composition of the tire must be sufficiently soft to protect the machine as much as possible from shocks and jars and thereby is of such a nature that it inevitably works loose when in operation, and is constantly being ground into its metallic cross or circumferential members, forced over any retaining flanges and sheared off, or driven against these parts by its tendency to come free at the top of the wheel and roll around the rim. Segmental or block tires are subjected to similar conditions around the base of the blocks and are sometimes so structurally weakened at this point as to be torn off through sudden application of load, such for instance as starting against a rut or car track or by the quick application of the brakes, or sharp steering, this being especially detrimental to this type of tire.

In order to overcome these difficulties there has been developed a method of construction in which a hard composition is made integral with the steel base or band to a suitable depth. Upon this foundation is vulcanized the resilient regulation tread. The tire is therefore unconfined, cannot chafe or cut itself on restraining members and can conform with entire freedom to meet the conditions encountered in service work. The steel base is held firmly to the wheel proper by special keys or bolts and when the tread is worn away it can be replaced exactly as it was installed in the original process of manufacture.

Pneumatics

When questions are raised regarding the advisability of equipping the commercial vehicle with pneumatic tires those taking a negative view of the matter are apt to present immediate and apparently insurmountable obstacles to use of such tires, but these seeming difficulties are upon serious investigation found to actually be factors recommending the use of this type of construction. Very serious damage is done to solid tires through coming in contact with sharp or abrasive objects in the street or road way, or by being nipped in car track frogs or torn by being forced into or out of such tracks, while the pneumatic presents a superior defense against just such dangers which mean destruction to the solid types, as for instance in its very lack of internal structural rigidity, its ability to transfer and distribute stress throughout its entire mechanism, and by its incomparable resiliency whereby it actually absorbs shock instead of merely dulling it.

The question of possible weight limit is also often brought up, but who is to decide what the limit shall be? The demand will be met by the tire manufacturers as they have met the demands made upon them in the past.

Many service cars of medium weight and high speed use no other equipment and many truck makers advise the use of such tires and design their product accordingly, realizing the saving they can effect by not being called upon to protect their running gear and power plants from the pound of the solid tire.

The pneumatic is being applied daily to vehicles of greater and greater load capacity, the rear wheels usually carrying the twin or dual tires, and in some recent passenger 'bus developments, where a greater degree of comfort is being demanded by the "fares," and where the total weight of the apparatus with its full complement of passengers is very great, dual tires are used in front and triple in the rear.

The first cost is of course the main consideration with many purchasers, but the saving maintenance in all the items constituting the truck's equipment should prove a factor worthy of careful consideration. The speed of the motor truck is being constantly increased although the solid tire may have been acceptable at the slower speeds; it will of necessity have to be discarded at the pace at which the commercial vehicle will travel in the near future.

Metal Tires

In the foregoing no mention has been made of metal tires or of the many schemes of combination metal and rubber tires or of interposed springs, buffers and cushions or spring wheels pure and simple. None of the devices so far evolved are worthy of serious thought, nor does it seem likely that they will, or especially desirable that they should be, produced—pneumatic tires and a properly sprung chassis constitute the perfect combination. It may not be amiss here, however, to suggest to those who would keep in touch with the trend of the times that they watch the wire wheel.

Dual Treads

In apportioning the proper size of tires to be used in dual tread types it is the general custom to allow a greater weight per tire when so used than when that same size of tire operates alone.

To appreciate the reason for this it is only needful that such an equipment be observed in actual use under service conditions. The tires aid and assist each other in every possible way, divide the responsibility of their common duties, act in unison and with less individual stress in resisting side strains and by their usual greater combined tread width bridge minor obstructions and depressions and save themselves from shock and abrasion. Dual treading also provides about the only natural means of overcoming a tendency to skid. A block tread dual tire is even better in this respect as a more or less sharp face is presented at all times to the treacherous road surface. There is also less tendency for the space between the two tires to pack up with snow, ice or mud, as sometimes occurs with plain dual treads. There is, of course, no real preventive or safeguard against skidding unless metal be brought into intimate contact with the surface of the street or road, and with this idea in mind attempts were made to introduce the metal button non-skid tread into the solid tire, but without any degree of success; the "cats-claw" devices are, on a road of any hardness and under load, only pushed in the soft rubber of the tire. Several effective detachable devices are available however, having more or less detrimental effect on the tire.

Maintenance

The chauffeur operating a pleasure car, who expends any time in the inspection, care and repair of minor injuries to the tires is a rarity. A small cut appears, it is enlarged day by day, water enters, reaches the fabric, which rots way, and a blowout occurs—then and not before is the tire given attention by being removed and replaced by another to go through the same cycle while the burst envelope is carried to the tire company's claim agent and exhibited as an evidence of the poor service provided by the particular make.

The tires of no matter what type should be as carefully washed as is the vehicle itself, all grit, sand and foreign substances being removed from the body of the tire and from between it, and any attaching or holding members, and in dual and block treads, the interstices should be also thoroughly cleaned out. The tires should then be inspected for cuts or tears, and any found probed with a small blunt tool to ascertain whether fragments of glass or other material have been picked up. It is then in many cases advisable to plug the cut with gum compounds manufactured for that purpose, and in these operations it must be kept in mind that the tread of the pneumatic tire contains much more real rubber than the solid tire. A solid tire of pure rubber, entirely aside from its enormous cost, would not wear at all well and the tire engineer has had to so proportion the compounds entering into the composition as to obtain the maximum of resiliency and durability at a minimum of cost. Any slivers or strips of solid tire should be closely trimmed off, for although the loose piece may afford some protection to the rest of the tire and do perhaps a small share of work, the next wrench from a car track may strip a whole section with the start already made. Running in car tracks at all is ruinous to tires, but is too much of a temptation for the ordinary driver to resist, and in fact is often necessary when speed is essential and the roadway rough.

The care and repair of tires is greatly simplified and aided by any system of detachable tire or tire and rim, and while naturally more costly will often save the investment in instances where to lay up the truck awaiting repairs, or renewals from the factory would be obviated by the possibility of replacing the damaged tire by a spare unit ready to be shipped into place. It is well in such construction to treat the parts which come in contact when set up with graphite or other suitable material, so that they will take down easily and will not rust together when in use.

The greatest evil that the manufacturer of both truck and tire have to contend against is overloading. This is often done without intention, but this does not help matters, and a manager imbued with an idea of false economy may even cause the trucks to be overloaded in the hope perhaps of reducing his cost of delivery. The equipment cannot long withstand such abuse, and a truck must be taken out of service for repairs with perhaps a tire crushed and an axle sprung. The man may not even then realize the difficulty and, instead of buying more trucks, imposes upon the already overloaded motors the load which the disabled car cannot now carry, and thus his entire equipment is wrecked and his organization disrupted.

The Commercial Vehicle in Great Britain

A REVIEW OF ITS DEVELOPMENT UP TO THE PRESENT

BY OUR FOREIGN CORRESPONDENT

In Great Britain we can fairly claim to have had a bigger experience than any other country in the use of the commercial vehicle in general and the motor 'bus in particular, but, though we, over here, hold that British manufacturers of utility cars are now second to none, it must be remembered that in the early days of the commercial automobile, most of the larger vehicles in use were supplied from Germany and France. Since, however, Great Britain was far and away the largest buyer, British conditions have more than any others influenced the design of the heavy motor vehicle in Europe, and, therefore, in order to have a proper appreciation of the commercial vehicle proposition in Europe at the present day, one must know something of the conditions which led up to the present stage of development.

The Law and its Influence on Development

When self-propelled vehicles were first legalized on the roads of Great Britain in November 1896, the maximum weight limit of three tons was, with the knowledge then at command, far too low to lead to much development of the heavy industrial motor. To all intents and purposes its real beginning started with the introduction of the Heavy Motor Car Order at the beginning of April, 1905. This enactment dealt solely with cars above two tons weight (a ton in the United Kingdom amounting to 2240 lbs.) and permitted weights up to five ton unladen. The speed limit for all these heavier vehicles was put at 12 miles an hour, provided they were fitted with rubber tires, but in the case of steel or iron tired wheels, varying speeds were allowed; wagons from two to three tons traveling up to eight miles an hour, and from three to five tons at five miles an hour. The law concerning trailing vehicles was also made explicit, and under this Act all automobiles hauling trailers have to keep to five miles an hour—so much for speed and unladen weights.

Now the law says a five ton wagon must not weigh more than 12 tons loaded, and a trailer is restricted to an axle weight of four tons. Theoretically, therefore, assuming the tare weight of the trailer to be two tons, what we call a five tonner with trailer is, in the eye of the law, capable of moving thirteen tons useful load. In practice, however, though the roads over here are good, it is not generally found possible to total useful loads of much more than 8 tons, and even these are not very often handled.

These are in the main the regulations that have influenced the growth of the heavy industrial movement in this country, and although spasmodic efforts had previously been made with motor omnibuses and wagons, (and in some cases automobile wagons were in successful use) no real advance had been effected until this Heavy Motor Car Order came into force.

Public Service Vehicles—The Motor Omnibus

The new regulations were the signal for the introduction of the motor 'bus on the streets of London, most of the earlier machines being German made. Naturally, the new means of transport had to make its way against opposition from many quarters, which was scarcely to be wondered at, seeing that the practically untrained drivers of the day were terribly severe on their machines. Added to these natural difficulties the company promoter, seeing his chance, floated company after company on the market, and rotten though many of the undertakings were, the public subscribed a good deal of money;—enough at any rate for the demand to exceed supply, so that chasses totally unsuitable for the purpose were eagerly bought up for motor omnibus work.

Those were strenuous days when the engineers of the different garages vied with each other in keeping the biggest percentages of their cars on the road, regardless of later consequences. In the light of present knowledge such methods cannot be commended, but they at least led to a proper organization for the supply of spares, and brought the rapid changing of engine or gear box in a chassis to a high art, besides teaching us much in the way of quick and effective repairs, temporary and otherwise.

To give some idea of what the average of traffic is like in a crowded street, I may mention that, in 1907, the London General Omnibus Company took some statistics which showed that during the course of a double shift day of nineteen hours, on the average an omnibus running 115 miles, was stopped 690 times, was subjected to 2530 brake applications and the gears were changed 1035 times.

In a way these over-severe trials to which the motor omnibus of the early days was subjected did good in searching out the weak points in the minimum of time. In those days nearly all engines and gear boxes were secured to built up frames of ordinary rolled channel steel by four arms, and the number

Peculiar Petrol-Electric 'Bus

Fig. 1. An old-time Milnes-Daimler 'bus of a similar type to that put on the London streets in 1905. Note the perch bars running backward to the back axle

of these broken cast aluminum arms was enormous. Incidentally, this fact contributed largely to the encouragement for the discovery of a satisfactory means of mending broken castings, both in iron and aluminum, and much money that would otherwise have been lost, was saved by the resulting processes.

The motor omnibus also certainly taught us that a three-point suspension is the proper means of securing the gear box to the frame, and the same system should be adopted for engines, if it is possible to place the supporting ends of the arms sufficiently far apart.

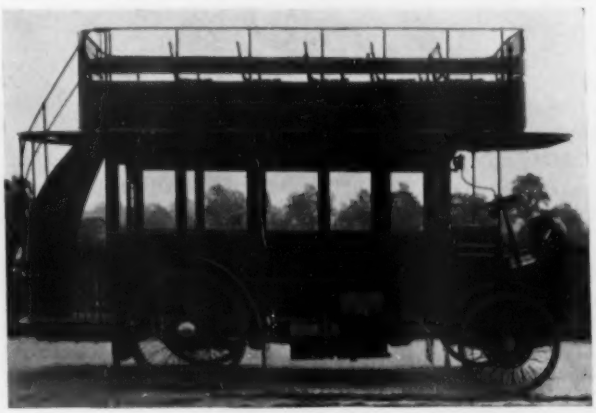
The most notable mechanical features of the early omnibuses generally lay in the adoption of chain or internal geared ring drive. The latter system was represented by the Milnes-Daimler omnibuses, which had their differential mechanism so arranged as to permit of the wheels being splayed suitably as was thought at the time, to the general camber of the London road surfaces, for a good many of the contours are rather excessively cambered. A closer study of the question, however, is leading people to revise their views on the matter of splayed wheels, and to adopt the straight axle.

In the earliest examples of the chain-driven omnibus, the power was transmitted to sprockets on each of the rear wheels through the medium of ordinary roller chains, but after a little these were so noisy as to necessitate their substitution by chains of the inverted tooth type. Still, as ill-usage of unskilled drivers and new and inexperienced engineers dealing with an unknown quantity told its tale, the ponderous vehicles became so noisy as to give color to an agitation carefully worked up by certain vested interests, who saw to it that public feeling was aroused, and thus the Commissioner of the Metropolitan Police (whose power in the control of London public service vehicles is as absolute, if not more so, than that of the Czar is in Russia) may have had his hands forced in the matter.

Still, even before the agitation against the motor omnibus, the police were not always helpful. Inspectors appointed to license the vehicles had no engineering training, and any absurd pretext, such as a broken lamp glass, was sufficient for them to stop a car from work. But this lack of mechanical knowledge was not an unmixed disadvantage; the engineers used to fill their gear boxes up to the top with masses of thickest possible grease, so that the sound from the noisiest gears was reduced to a minimum, and many other wheezes did they play on the hapless inspectors.

It is the gear box and gear transmission that all along has been the trouble with the motor omnibuses, and many attempts have been made to do away with the noise, and the wear and tear of noisy sliding gears. One company, some three or four years ago, introduced a very quiet running, but rather heavy 'bus, with epicyclic gears and chain transmission, that certainly promised well, but they only remained on the streets for a few months before the company went into liquidation . Then, too, we have the Darracq-Serpollet steamer working with a flash boiler, and this is with us until this day.

Most attempts to cope with the problem, however, have been in the direction of electric or petrol electric transmission, and the accumular driven "Electro 'busses" with Tudor batteries were running for quite a long time. Many of the earlier systems, in fact, involved the use of accumulators, and it has taken long to convince inventors that only a revolution in the manufacture of secondary batteries will justify their use to this extent. Still, it is quite possible to use accumulators, and they are used on modern systems in such a way that the whole of the power does not pass through them, but they act only as an auxiliary serving to increase engine power when required on emergency, and in such systems they are so arranged as to remain almost fully charged by absorbing any surplus of engine power in excess of the vehicle's requirements, and using the braking effort also as a means of charging. Quite one of the most interesting vehicles on this system was the Knight-Pieper-Lanchester 'bus, constructed by the Daimler Company. This machine, which was designed to carry the regulation



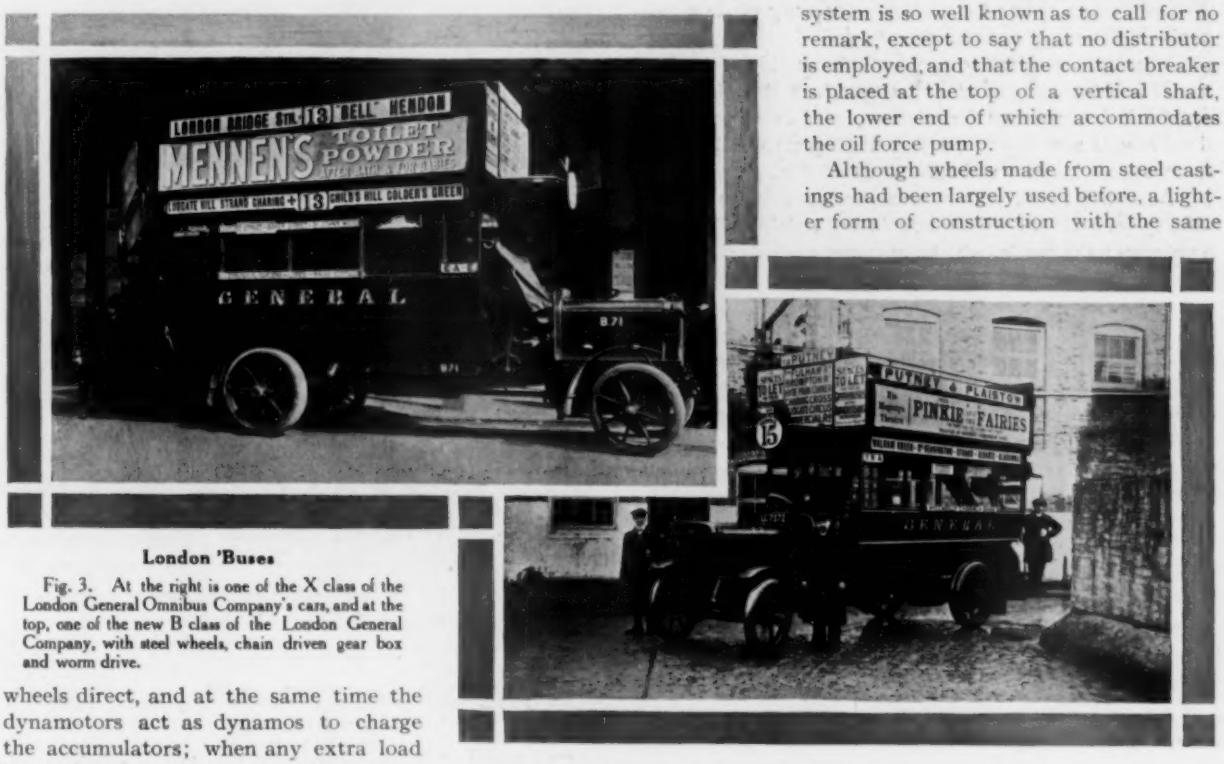
A Pioneer

Fig. 2. The Daimler-Knight petrol-electric 'bus

number of 34 passengers (16 inside, 18 out) is revolutionary in design. In the first place the frame is made from a sheet of steel formed into trough section and stiffened transversely here and there by the channel steel members that transmit the

weight to the spring hangers. The channel section of the trough renders it very stiff longitudinally, and also accommodates the well of the body.

To each side of the trough frame the driving plant is secured beneath the seating level of the interior of the 'bus. Each plant consists of a 12 h. p. sliding sleeve valve engine, and a dynamotor driving its back road wheel through a worm gear, the road wheels being mounted on the ends of a cranked axle tree. In each mechanism a magnetic clutch and brake is also included. As the electrical system provides the necessary balance, a mechanical differential gear is unnecessary. In ordinary running the two engines drive their respective road wheels direct, and at the same time the dynamotors act as dynamos to charge the accumulators; when any extra load has to be taken, the accumulators, automatically coming into play, drive the dynamotors as motors and so add to the available power.



London 'Buses

Fig. 3. At the right is one of the X class of the London General Omnibus Company's cars, and at the top, one of the new B class of the London General Company, with steel wheels, chain driven gear box and worm drive.

Other systems have relied purely on an arrangement of dynamos and electric motors, but in these types we find great difference of opinion as to whether the current should be continuous or alternating. At present the supporters of petrol electric systems appear in general to be doing little, and those who are working on the subject are rather going on the lines of attempting less than has been tried in the past, and endeavoring only to replace clutch and gear boxes, and drive through a differential back axle instead of the electrical balance method by which many of them obtained differential action in the earlier models.

Three and a Half Ton Regulation an Advantage

To revert to the police regulation, which at first held back, but later has tended to develop the motor 'bus, stringent as the regulations have been, it must be admitted that their last important move in stipulating for a maximum unladen weight of only 3½ tons has worked wonders for the industry, criticised though it was at the time.

This 3½ ton limit has been the influence that has produced the X and B classes of motor 'buses. Some sixty of the X class were constructed at the works of the London General Omnibus Co., at Walthamstow, and in these a worm driving live back axle, with the worm on top, was the outstanding feature. The four-cylinder engines, which are thermo-syphon cooled, develop about 30 h. p., and a distinctive feature about them is that ignition is effected by means of coil and accumulator in preference to any magneto system. On the face of it, this looks like a retrograde movement, but the decision to adopt what is generally known as an old-fashioned type of ignition was solely due to carefully kept records of the performances of previous vehicles. The system is so well known as to call for no remark, except to say that no distributor is employed, and that the contact breaker is placed at the top of a vertical shaft, the lower end of which accommodates the oil force pump.

Although wheels made from steel castings had been largely used before, a lighter form of construction with the same material was introduced on these vehicles, a special method being employed to allow for easy detachment of the rim. These 'buses showed certain defects, but apart from these inherent faults, would certainly have been a great success when compared with their predecessors, and would probably have been made into an unqualified success, if they had not been followed by the wonderful little vehicles belonging to the B class, which in general appearance look scarcely larger than a horse-drawn omnibus, and are very different from their unwieldy predecessors that are, of course, still allowed to run and finish their existence under the old 5-ton limit.

Like the X class, these machines transmit their power through a leather cone clutch to a gear box in which inverted tooth chains are employed, and thence the power is taken to the back axle by means of a worm placed above the axle. Recently, too, a new wheel design has been introduced on these machines, and the accompanying photograph will give a general idea of their neat appearance.

These machines were the outcome of the experimental work with the X class, and it is not too much to say that they

bid fair to revolutionize public service street traffic in London. Though it is early as yet to form any definite opinions about their wearing qualities, they have certainly caused quite a revulsion of feeling in favor of the motor 'bus, for they are nearly as quiet as a private car and compare most favorably with the clumsy, thundering, undirigible trams with which certain thoroughfares are cursed, and which not uncommonly experience breakdowns hanging up whole lines of tram cars at a time. Aleady the question is being asked whether the day of the tram car is not past.

FRENCH MILITARY TRUCK COMPETITIONS

This year's French military motor truck competitions are to be conducted by the War Department of the French Government without any outside help. Heretofore the Automobile Club of France has co-operated with the army officials, particularly in the work of securing entries.

The date for this year's competitions is July 18 to August 11. It is not a competition in the sense that it evolves a winner, for it does not, and the prize competed for, a governmental subsidy, is awarded to every contesting car which performs up to a certain set standard.

According to the present arrangements this year's French military competitions will be held in the vicinity of Versailles, from where the trucks will be sent out each day, loaded, or light, or in convoys, with an official control of all fuel and lubricating oil consumed, the judgment of the officials being based on regularity and economy of operation. That the French manufacturers attach considerable importance to securing the privilege of applying for the army grant is evidenced in the fact that no less than fifty-eight trucks have been entered. These embrace the products of fourteen manufacturers and include such well-known vehicles as De Dion Bouton, Renault and Aires.

PARIS HAS AUTO STREET SWEEPERS

The street cleaning department of Paris, France, has decided to abandon the use of horse-drawn sweepers for cleaning city streets and has purchased a few motor sweepers to be followed by others when the correct design and construction are secured. The machines now in use are made by Renault Freres. The motor is a small two-cylinder one, similar to the one employed extensively in Paris for taxicab work. The power plant is entirely forward inasmuch as large diameter metal shod wheels are employed. At the rear, the frame members are strongly upswept, very large diameter wood wheels being employed. Suspension at the rear is secured by means of a transverse inverted semi-elliptic spring. Drive is taken to the rear axle through a three-speed gear box, the gears being operated by the usual type of side lever, while a separate central lever serves to put into gear the shaft driving the rotary brush.

MOTOR VEHICLES IN GREAT BRITAIN

Motor vehicles are used for every kind of commercial purpose in the United Kingdom. For instance, for carrying travelers' samples, the drummer touring the country with a motor vehicle, so as to reach the small towns instead of going by train; as delivery wagons for breweries, railways, bakeries, department stores, fish and poultry stores, hardware, flour and seed merchants, grocers, coal and coke delivery, for express parcels service; by the postoffice Department for carrying mails, not only in cities, but between large towns; for road work, one machine being fitted not only as a road roller, but as a sprinkler at the same time; railways employ them for carrying traffic and freight from stations at distances in the country, there being parts, for instance, in Cornwall and Devon, where a great deal of railway service is done by motors on the roads; for sewage purposes, with a vacuum tank attached; as watering carts; for tower wagons for repairing trolley wires; for fire engine purposes; one manufacturer makes a motor car to which is attached a train of wagons, four in number; for omnibuses; pleasure vehicles to carry large numbers of people; for a tipping wagon to carry coal, sand, or gravel; as oil wagons; for the carrying of heavy machinery; with three wheels for quick delivery purposes; for heavy freight from docks and railway stations and elsewhere, and for almost every conceivable commercial use for which heretofore horses have been employed.

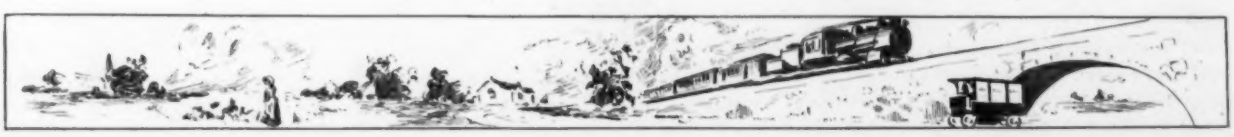
Some of the power is steam, but in most cases gasoline engines are used. Some of the heavier wagons have a carrying capacity as high as five long tons. The tendency throughout the United Kingdom seems to be to use motor propulsion for commercial purposes to a greater and greater degree, and to extend the purposes for which it is thus employed.

THE COMMERCIAL CAR JOURNAL IN EUROPE

The description of the new Pierce Arrow truck, which recently appeared in the COMMERCIAL CAR JOURNAL, attracted a good deal of attention in Europe; in fact *Motor Traction* of April 22nd, devoted an article to emphasizing the similarity in many points which this truck possesses in common with the best British practice of the last few years.

TAXIMETER REGISTERS TIME, NOT DISTANCE, WHEN RUNNING SLOWLY

Under the present cab regulations the taximeter registers 8 pence for every mile, and after the mile, 2 pence up for every quarter mile, but if the speed, owing to traffic or other causes, falls below six miles an hour, the taximeter at once proceeds to register by time instead of speed, on the basis of 8 pence per ten minutes.



A British Worm-Driven Turbine Fire Engine

THE DENNIS COMMERCIAL MACHINES

AT the present time when the problem of worm transmission is attracting so much interest, a discription of a machine turned out by a firm that can claim to be the pioneers of the worm drive for commercial automobiles, offers points of distinct interest. Incidentally also the design, distinct as it is in many ways, is typical of sound English practice; for the firm in question is Dennis Brothers, of Guilford, who, with the Lanchester Company, share the honor of being the first to render worm-driven automobiles practicable; but while the Lanchester Company has confined its energies solely to the private car, the Guilford firm, from the earliest days of commercial car development, has devoted a great part of its attention to the manufacture of utility automobiles of all sorts.

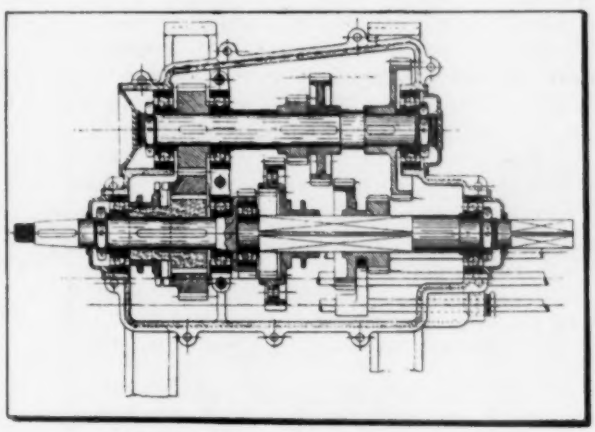


Fig. 1. Section of Dennis four-speed gear box in plan

Standardization and Specific Requirements

The Dennis energies cover a very wide range, from producing an 8 to 10 cwt. delivery van and a cab chassis to the 34-passenger motor 'bus, or even a 5-ton wagon, but with an eye to the worm-drive proposition the greatest interest centers in the heavier types which afford excellent examples of a standardized design so arranged as to be readily adaptable to the special requirements of various branches of the commercial business.

To illustrate this point we will take one of these specialized examples and note how standard practice has been altered to comply with specific requirements, and for this purpose we cannot do better than study one of the turbine fire engines, a type of machine that Dennis Brothers have made peculiarly their own.

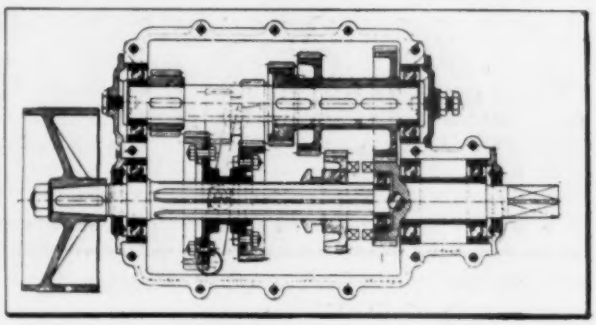


Fig. 2. Section of small three-speed Dennis gear box

The Engine

In this we find the 35 H. P. or 40 H. P. four-cylinder gasoline engine, as used in the 3 and 5 ton vehicles, supplanted by a six-cylinder prime mover of 70 H. P. This, however, contains all the essential features of Dennis engine design, comprising cylinders cast separately, a single jet carburetor, high tension Bosch magneto ignition (dualized with an accumulator system if required), with a distributor on a vertical skew-gear-driven shaft midway along the length of the engine, the magnets timed to fire, in its most advanced position, when the positions are ½ in. from the tops of their stroke.

Lubrication

The outstanding feature, however, is the lubrication. Oil is circulated to the engine bearings by a pump located in the base of the crank case. This pump passes oil under pressure to all the bearings, after which the oil again drains down to

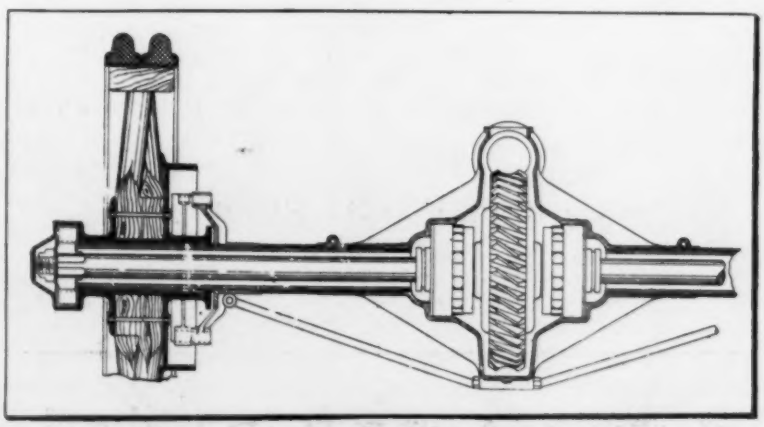


Fig. 3. Section showing the Dennis worm-driven live axle for heavy work. This is a design that has been in use for many years

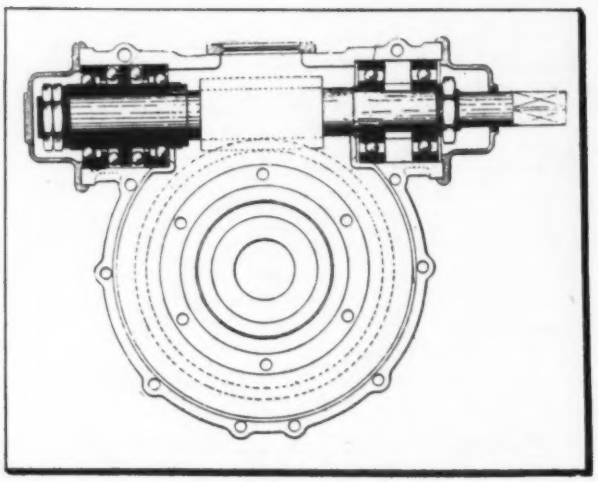


Fig. 4. Section of the worm and wheel, showing the worm mounted between double rows of ball bearings

the bottom of the crank shaft, and is filtered before again being passed to the pump. Objection may be raised to thus using oil twice over, but in practice it has been found to give no harmful results, and where machines are running day in and day out on commercial work, the oil bill certainly has to be studied. Records are extant showing that a 2-ton van lubricated on this system can be driven for 500 miles on a single gallon of lubricating oil.

Interchangeability, a feature not studied to the same extent in Europe as in the United States, has, of course, in a machine of this class, been very carefully considered, and cylinders, pistons and other working parts are ground to limit gauges.

In all the Dennis engines the cylinders are cast separately, and the crank shaft supported on bearings between each cylinder, a point of rather special note, in view of recent experiments in balancing of crank shafts having gone to show the desirability of the shaft having all the bearing support possible.

Transmission

From the engine the power is transmitted, in the trucks, through a leather covered large diameter cone clutch to a gear box, with double universal joints interposed to allow for any "whip" in the frame. This box affords four forward speeds and a reverse, the rations being 3.29, 2.01, 1.36, and direct for the first, second, third and fourth gears, giving speeds of 5.2, 8.4, 12.2, and 16.1 miles an hour respectively,

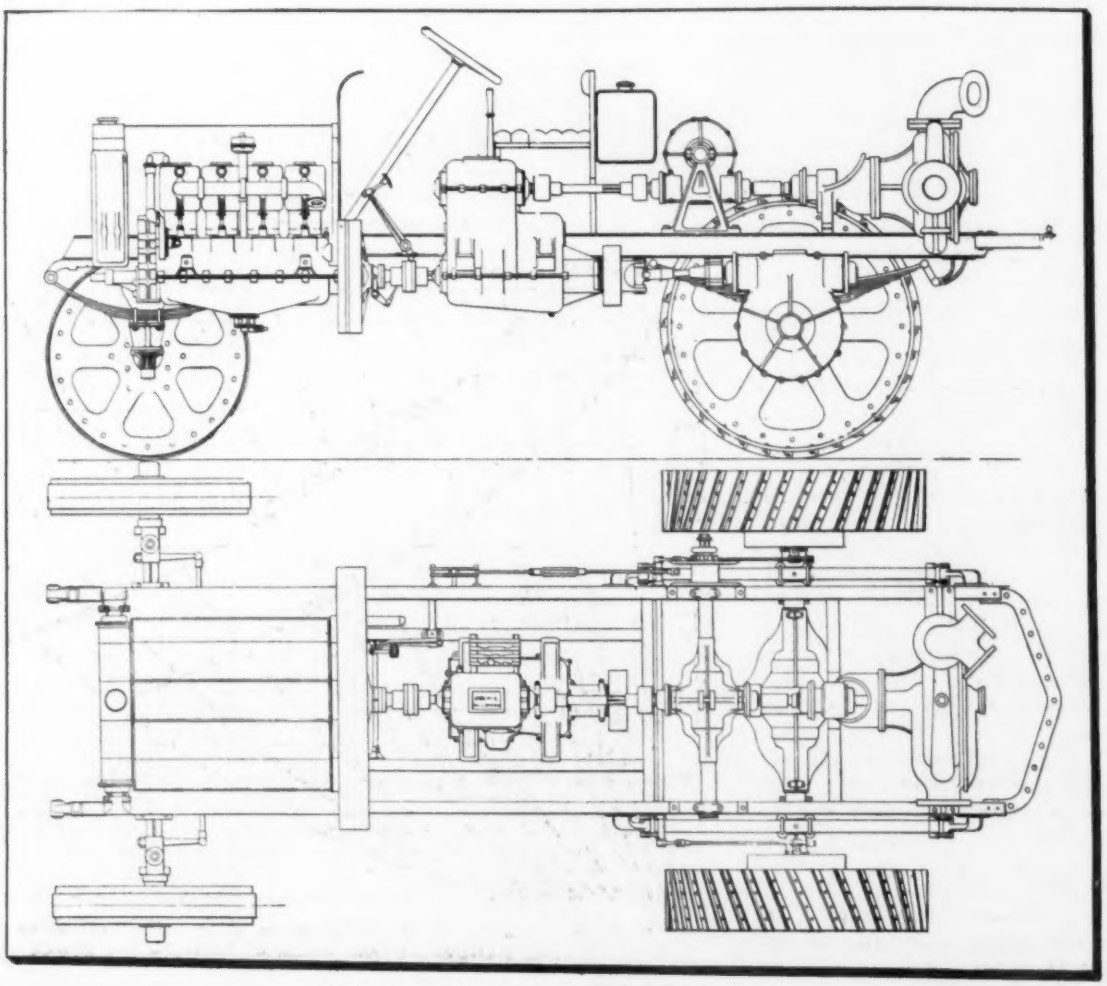


Fig. 5. A worm driven combined tractor and irrigation machine

at 1000 engine revolutions per minute, while the reverse has a gear ratio of 4.33. Ball bearings are fitted throughout in this box, which is so designed that the lower part can be easily removed without disturbing the gears, when it is

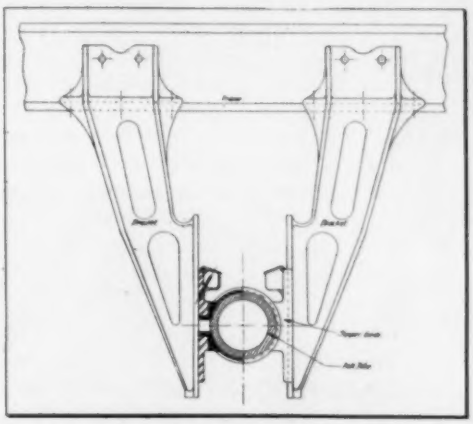


Fig. 6. Showing the method of retaining the back axle between horn brackets

desirable to lay them open for inspection. As will be seen, the change gears slide along a castellated shaft having its feathers milled from the solid, and another point to note in the four-speed box is the spigot bearing with the secondary shaft running in a ball bearing within the dog clutch on the primary, and supported against thrust by a single large ball at the end.

In the design modified for fire engine work the gear for driving the pump is interposed between the clutch and the gear box, necessitating the latter being placed further back on the under frame, and the universal joint shaft to the back axle being much shortened.

It is in the back axle, of course, that one of the special Dennis features lies. The hardened steel worm is placed above the axle and runs at each end on large ball journal and thrust-bearings, while the gun metal worm wheel encircles the casing of the balance gear, which last is of the parallel pinion type, with six planets and two star pinions. The whole mechanism is contained in a malleable casting, reinforced, as seen in the drawing, by extension live axle casings screwed in and locked to the central casting. It is these extension casings that take the bearing of the road wheels, and thus entirely relieve the driving shafts of bending stress. The driving axles are consequently only subjected to torsional stresses.

For the front axle two strong channel sections of forged steel are riveted to each other and to forged arms, which carry hardened ball races in which the steering swivels rotate.

Springs, Brakes and Wheels

In the standard Dennis design no radius rods are used, for the axle casings, under spring action, slide vertically in horn brackets, which take all the propelling stresses from the road wheels to the chassis. It might be thought that the spring action being thus restricted to a dead vertical path would result in rather rough riding as far as the horizontal components of road shocks are concerned, but curiously enough this does not appear to be the case, at any rate in the writer's experience, as he has known these vehicles afford extremely easy riding over very lumpy roads at comparatively high speeds.

The spokes of the wheels are alternately staggered in opposite directions between the hub and the rim.

At the back of the gear box is the foot brake with external shoes made to operate on the brake drum through the medium of a double side cam action, as indicated in the drawing of the complete fire engine, while two cast iron shoes, moved by compensating mechanism, expand against the inner surfaces of drums on each back wheel.

The Pump

Reverting now to the pump, the gear wheels already mentioned, run on ball bearings, and when put into mesh by the lever at the left of the driver, the pump is coupled up to the engine through the medium of the upper shaft, which is provided with universal joints at each end.

The Dennis firm have had considerable experience with pumps of the turbine type, and as a result have confined themselves conclusively to this type. Among other reasons for adopting the turbine pump, it is urged that with this type shut off, nozzles can be used at all times, as when working from a hydrant, and deliveries can be shut off without any fear of injury when the pump is working at full pressure. This is a valuable asset when it is desirable to avoid water damage. Simplicity is another factor, for with the turbine no valves, leathers or other complications are necessary, and it is this that largely contributes to the capacity of the turbine for working with dirty or muddy water. It is also

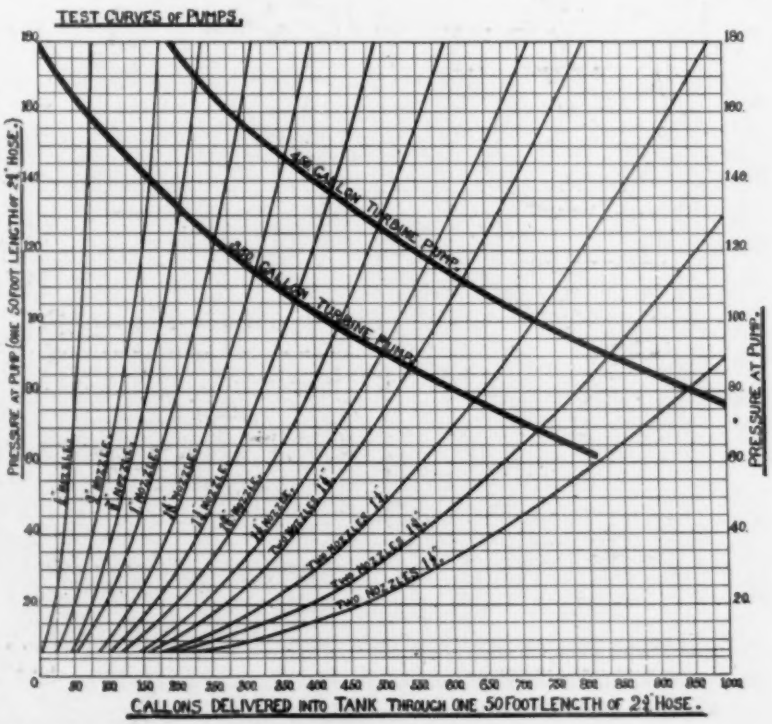

TEST CURVES OF PUMPS.
PRESSURE AT PUMP (ONE 50 FOOT LENGTH OF 2½" HOSE.)
PRESSURE AT PUMP.
450 GALLON TURBINE PUMP.
350 GALLON TURBINE PUMP.
GALLONS DELIVERED INTO TANK THROUGH ONE 50 FOOT LENGTH OF 2½" HOSE.

Fig. 7. Diagram showing result of tests with 350 and 450 gallon turbine motor fire pumps

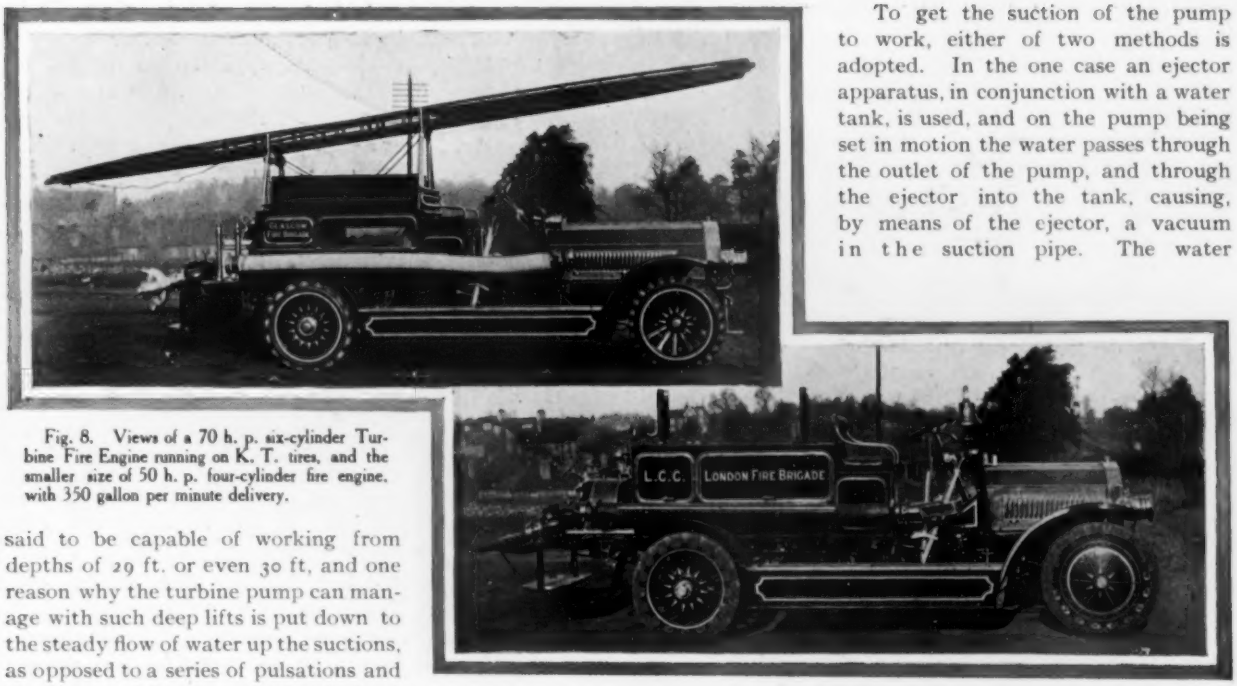


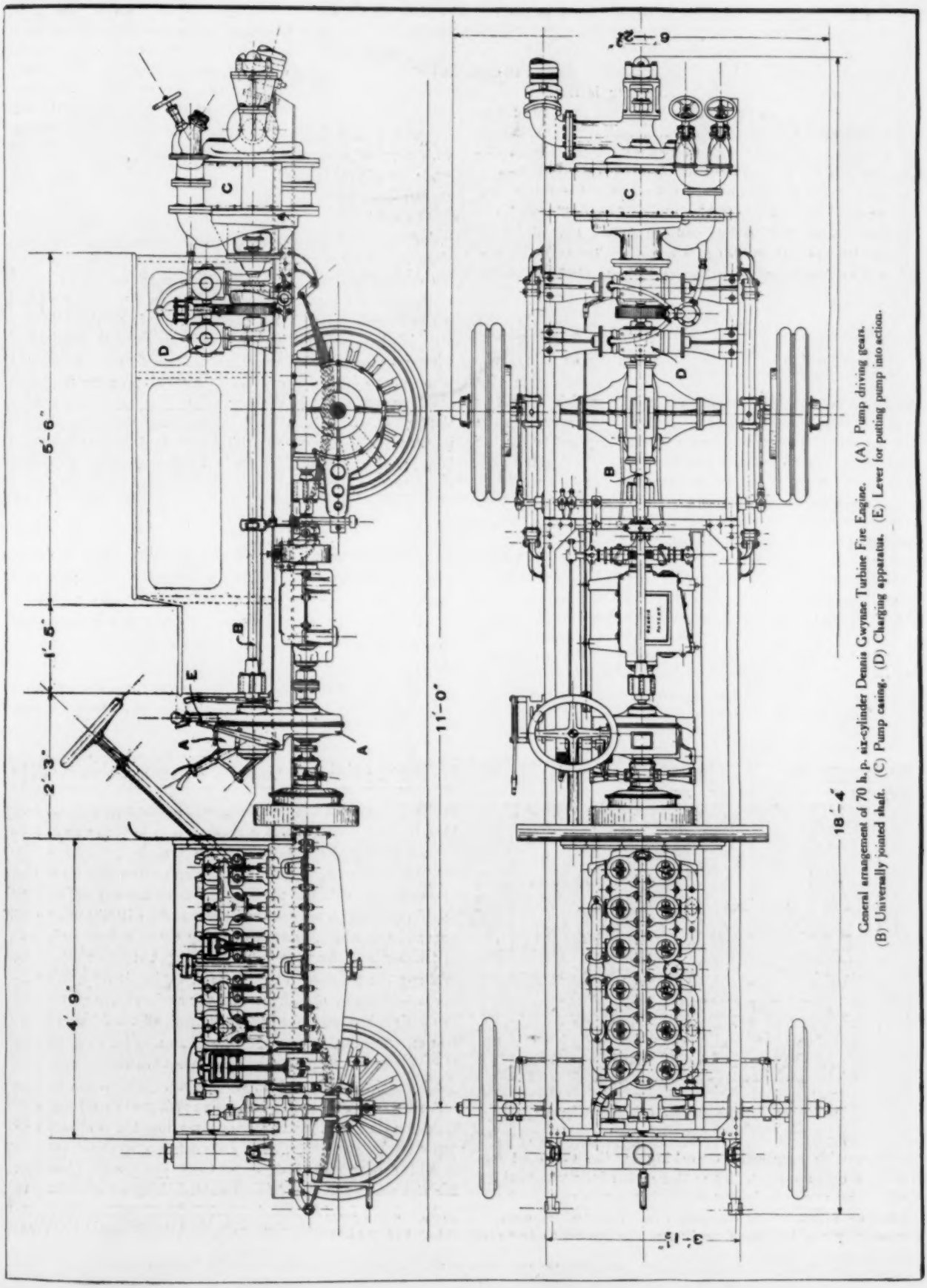
Fig. 8. Views of a 70 h. p. six-cylinder Turbine Fire Engine running on K. T. tires, and the smaller size of 50 h. p. four-cylinder fire engine, with 350 gallon per minute delivery.

said to be capable of working from depths of 29 ft. or even 30 ft, and one reason why the turbine pump can manage with such deep lifts is put down to the steady flow of water up the suctions, as opposed to a series of pulsations and the large weight of water that is kept moving all the time in the suction. The makers also maintain that the turbine pump will work at double its given nominal capacity and and still retain a high efficiency; a view which appears to be substantiated by the results of tests given here in diagram form. These graphs go to show a far higher average efficiency than usual when working under the varying conditions which a motor fire pump is called upon to face; as for example, delivery of a small jet at high pressure, or a "damping down job," perhaps with open hose.

To get the suction of the pump to work, either of two methods is adopted. In the one case an ejector apparatus, in conjunction with a water tank, is used, and on the pump being set in motion the water passes through the outlet of the pump, and through the ejector into the tank, causing, by means of the ejector, a vacuum in the suction pipe. The water is never used up, but only circulated and used as a means for obtaining vacuum, so that the pump can be charged an indefinite number of times on a given quantity. As a matter of fact, the tank carries 50 gallons, and since 10 gallons is ample for the pump, a good 40 gallons is available at any time for first-aid purposes.

The alternative method obviates the necessity of carrying any water. By this system after the pump is thrown into

Fig. 9. A three-ton worm-driven truck. Note the engine-driven winding drum for loading purposes at the side of the driver's seat



General arrangement of 70 h.p. six-cylinder Dennis Gwynne Turbine Fire Engine. (A) Pump driving gear. (B) Universally jointed shaft. (C) Pump casing. (D) Charging apparatus. (E) Lever for putting pump into action.

gear, a double cylinder air pump is set in motion on pressing a pedal, and in a few seconds air is exhausted from the pump and suction sufficient to work from a vertical lift of 28 ft. is available. As the water enters the pump the outlets automatically open and the air pump is thrown out of action, while of course a check valve is employed to prevent water entering the air pump and impairing its efficiency. This air pump is made with two entirely independent cylinders, so that the derangement of one does not affect the other, and thus the machine has a duplicate charging apparatus—a unique feature. The machine shown in our illustration is fitted with a 70 H. P. engine and can deliver 450 gallons per minute, but the makers also turn out a smaller 55 H. P. four cylinder engine for a 350 gallon per minute discharge.

An Irrigation Machine and Tractor Combined

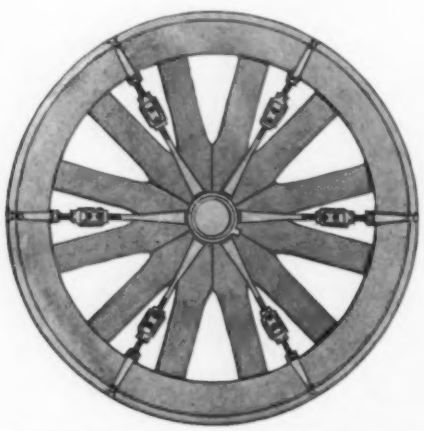
A modification of this principle of driving a turbine pump has been employed by the Dennis people in the design of a combined tractor and irrigation machine, which they first brought out some three years ago. In this the gear for driving the pump is obtained from a shaft contained within an upper extension of the gear box, and the mechanism is so devised that the pump can be instantly brought into action by moving a gear lever placed at the side of the driver. This disconnects the road wheel gear and meshes the pump gear, leaving the 30 H. P. engine exclusively available for driving the Gwynne turbine pressure pump capable of delivering 250 gallons per minute at 60 to 70 lbs. pressure. This gear box affords three forward speeds of 2½, 5 and 9 miles per hour, as well as a reverse.

The road wheels are built up of riveted steel plate, with rims wide enough to prevent sinking into the ground, while provision is made for fixing spuds when very soft ground is encountered.

In other respects Dennis standard practice is observed, including the worm driven rear axle; and worm transmission from the pump shaft is also employed to drive a winding drum when necessary for pulling a trailer up a hill, or helping the tractor to haul itself out of a ditch or any place where its wheels will not bite. The shaft of this drum is seen in the plan, and here we come to another example of what may be called Dennis standard modifications, for the pump gear of the fire engines is adapted on some trucks to work drums through the operation of mechanism exactly similar to that employed on the tractor, and these drums come in very useful in dealing with heavy loads where overhead lifting tackle is available, or in loading up such things as cars or other heavy loads on to the truck platform by means of ramps.

AN EXPANSIBLE MOTOR TRUCK WHEEL

The Turner Patent Adjustable Wedge Wheel Company, of Holloway, London, England, has placed on the market a new device for commercial motor vehicles, an illustration of which is shown. This wheel has a series of outwardly tapered steel wedges between the spoke ends surrounding



The Turner Expansible Motor Truck Wheel

the hub, with turnbuckles working on the threaded extremities of the wedges. The other ends of the turnbuckles are held by anchors riveted through the rim of the wheel. As the buckles are turned, they draw the wedges toward the periphery of the wheel and force the spokes to any desired degree of tightness.

At three equidistant points in the felloe are inserted outwardly tapered wedges fitted between the beveled ends of the section of the felloe. Two bolts pass radially through each of these wedges and by means of nuts on the inner threaded ends of the bolts, the wedges can be forced outwardly to tighten the wood felloe within the rim.

It will be seen that this construction enables the wheel to be assembled and securely tightened within the rim, without any heating or forcing on the latter, which would be likely to burn the sole of the felloe or warp the rim so that it would not present a true surface to serve as a base for the rubber tire.

The tightening members serve as suspension elements, acting in opposition to the spokes, which act as compression members. Thus, severe road shocks are distributed to all parts of the wheel, instead of being sustained by only one or two spokes. As the wheel can be kept tight at all times, without the trouble and expense of taking it off and sending it to the manufacturers, and the spokes have no tenons, the wedges having ribbed faces instead, all creaking is eliminated. The elements of the wheel can also be made lighter for a given load than in the ordinary wheel, so that the total weight is little, if any, greater. Individual spokes and sections of the felloe can be substituted readily at any time for damaged ones without tearing the whole wheel down.

This construction is designed to expand the wheel within the rim when the wheel is assembled, instead of shrinking on the rim or forcing it on in a cold press, and further tightening the spokes and felloe whenever desired without removing the wheel from the axle.

The Necessity and Value of Recording Devices on Commercial Motor Cars

VERY investigator who has written on the subject of the care which should be exercised in the operation of commercial motor cars, has laid particular emphasis upon the fact that these cars should not be driven at high speeds, both for the purpose of saving excessive wear on the tires, and the prevention of damage to the power plant through excessive vibration and shock.

If a driver has no means of telling when he exceeds the maximum speed at which he is supposed to drive his machine, he very often unknowingly drives too fast. It is therefore quite evident that speedometers, that is to say, instruments which show the speed at which a machine is traveling, are very essential to the proper operation of commercial motor cars. If the machine is not equipped with one of these devices, and the driver has nothing to guide him, he keeps going faster as the days go by, as he becomes accustomed to speed, and does not appreciate how fast he is going.

It is therefore very much more important that an instrument of this kind should be used on commercial cars than on pleasure cars, for in the latter case, it is used more for the purpose of gratifying the driver's curiosity as to the rate of speed at which he is traveling, or for the purpose of avoiding arrest through exceeding the legal speed limit, while in the case of the commercial car it is for the purpose of holding speed down to the point where the longest life of tires and mechanism is secured.

Some of the special speedometers which are put out for use on commercial motor cars are arranged so that the maximum speed at which the car is to be operated is marked on the dial in some manner, so that the moment this mark shows, the operator knows that he is exceeding his maximum speed. This is a very valuable feature for commercial car use.

Mileage Recording Devices

The mileage recording devices are also very important, as upon the total number of miles traveled by a commercial car must be figured the value of its service, and also the rate at which depreciation must be charged off. Furthermore, by means of an instrument of this kind, especially one which records all movements of the machine, the owner can ascertain just what transpires during a day's run.

Taximeters

Almost everyone is familiar with the great advantage of the taximeter, with which almost all taxicabs are equipped. These instruments have met with pronounced public approval, and they are of even greater value to owners of the machines than they are to the public, as some of them, in addition to showing the rider the distance he has traveled and the amount of his fare, also record very accurately every movement of the machine, showing at what time of the day it is in use, how far it has traveled, and at what speed.

This record is made on a tape which cannot be tampered with by the driver, so that the owner at the end of each day will know exactly how his machine has been treated by the driver. Devices of this kind are also in use on other types of commercial cars, and they would be very valuable in almost every instance.

We describe herewith all of the makes on the American market of recording instruments of various types adapted especially for commercial car use, and we would also direct our readers' attention to a device suggested in the columns of our April issue by Mr. Foljambe, to give warning when the load placed upon a vehicle reaches its maximum carrying capacity. It should prevent overloading, which is one of the most prevalent causes of unsuccessful operation of commercial motor cars, and is worthy of our readers' especial attention.

THE STEWART & CLARK MFG. CO., of 1828 Diversey Boulevard, Chicago, Ill., has designed a speedometer especially for electric automobiles and trucks. It is known as Model 41, having a 3 in. scale indicating up to 30 miles per hour, which is ample for any speed necessary for commercial car work. The instrument has a 10,000 mile season odometer and automatic resetting trip register. It lists at $20.00. This instrument is of the magnetic type. A feature of this instrument lies in the fact that the speed of the revolving magnet has been greatly reduced, namely 400 revolutions in place of the original 1000, which of course, greatly reduces wear. Another feature is the means for compensating temperature changes. The contraction and expansion of the inner case is taken care of by a lever which is made to raise or lower the aluminum cup, upon which the revolving field rotates, thus placing it in a weaker or stronger magnetic field, according to changes in temperature. A word as to the equipment. The flexible shaft used in connection with the Stewart Speedometer as well as the Stewart Swivel Joint is also

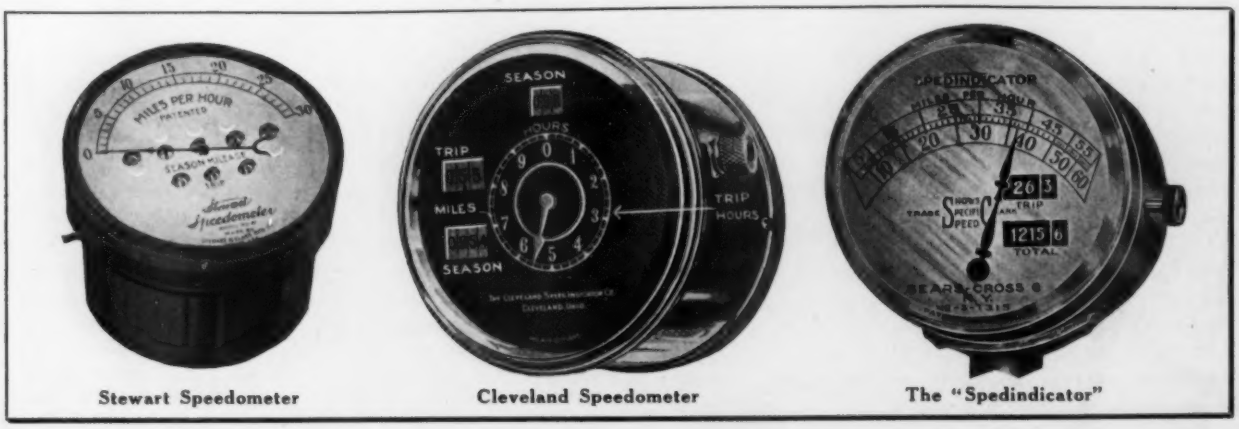
deserving of special mention. The swivel joint reduces the speed of the shaft 60 per cent. and also prevents breakage. It is made of durable materials, compact in construction with hardened plates between the two halves of the joint; these two halves are held in place by a steel shaft locked at each end. The driving spindle runs on imported ball bearings. The core of the flexible shaft is made up of links, one hooked into the other, and in the event of a break it can be repaired in a couple of minutes' time by simply hooking in a new link.

The SPEDINDICATOR, manufactured by the Sears-Cross Co., 685 Eleventh Ave., New York City, is made with an extra large dial, the same being fully 4 inches in diameter, silver plated with raised black figures, large and distinct, and can be easily read. This instrument is also of the centrifugally operated type. It has a speed scale of 60 miles and trip and total odometers. Special attention is called to the wheel attachment which is universal, inasmuch as it may be attached to any make and model of car, and can be adjusted to a fraction of an inch. It is water and dust proof. The spiral gears run in grease, so that wear is eliminated. The spindles revolve on bearings, of which there are four sets in the attachment, practically eliminating friction. The instrument illustrated is known as Model S and lists at $35.00; in polished brass, in full nickel or black enamel finish, $5.00 extra is charged.

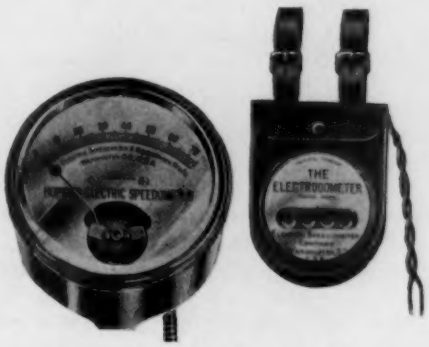
THE CLEVELAND SPEED INDICATOR CO., of Cleveland, Ohio, manufacture a recording instrument designed especially for commercial vehicles and known as Model B. This instrument records the season hours, the trip hours, the trip miles and the season miles. As will be noted from the illustration, there is no speed dial on the face of the instrument, the manufacturers stating that this part is not essential to the requirements of this instrument. The indicator in the center of the dial shows the actual hours of operation of the truck for each trip, or may be used to show the actual running time consumed for the entire day. From this instrument it is possible to obtain nine important points of information; actual running time for single trip; actual running time for the day; mileage for the day; mileage for the trip; average speed during trip; average speed for the day; actual hours of operation for any period; mileage for any period and average speed for season. The time indicated shows only the actual running time and not the complete time for making the trip, for when the truck is not in operation the mechanism of the indicator is likewise inactive, as the mechanism is automatically wound by the front wheel only every 1-30 of a mile during the actual operation of the truck. A systematic reading of this instrument will therefore prove a valuable asset in maintaining a record of the truck's performance. If a reading is taken every morning and every evening and the weight of each load is recorded, a complete report may be made of the actual work accomplished for each day. The instrument shown herewith lists at $35.00.

In the NATIONAL SPEED INDICATOR, manufactured by Wm. Herbert Jones, 147 Columbus Ave., Boston, Mass., the ball governor, in other words, the centrifugal principle, is again made use of. The balls of the governor fly further apart with the increasing motion of the car and the needle of the indicator is directly affected by the rate at which the wheel is moving over the road. All moving parts are mounted in ball bearings and all the working mechanism is made of tool steel. Each scale is 9 in. in length, allowing of easy reading. The mileage is recorded by a specially designed odometer of the Veeder type. The instrument is furnished with a 50 or 60 miles scale. The model illustrated lists at $30.00.

THE HOPKINS ELECTRIC SPEEDOMETER embodies the magnetic principle, the outfit consisting of a small magneto generator gear driven by the left front wheel of the car, and indicating volt meter located on the dash of the car. The two parts of the system are connected by a duplex insulated cable, which is armored with a spiral brass conduit to prevent mechanical injury. The illustration shows the electric speedometer which is attached to the dash board, as well as the electrodometer which is designed for recording the mileage of the car. The latter instrument is placed in series with the ignition storage battery or dry cells, as the case may be. At every 1-10 of a mile the contactor, which is located in the magneto of the Hopkins Electric Speedometer, is closed, allowing current to flow through a small electro magnet (solenoid) within the electrodometer case. When this solenoid is magnetized it draws to it an armature, thereby rotating the number disc. Each 1-10 mile reading occurs instantly at each contact. Although the instrument shown has a 75 mile scale, the Electric Speedometer Co., Evans Building, 1420 New York Ave., Washington, D. C., manufacture a special 30 mile instrument for commercial work. The instrument or indicating head is a specially designed volt meter of the D'Arsonval or permanent field type. It consists of a permanent horse shoe magnet, between whose poles swings, in



Stewart Speedometer **Cleveland Speedometer** **The "Spedindicator"**



Hopkins Speedometer and Electrodometer

National Speedometer

"Ever Ready" Speedometer

an arc of 90 degrees, an extremely light moving system. This moving system is supported by two extremely large and ruggedly constructed sapphire bearings. Due to the principle of this instrument the moving system is susceptible to the minutest electrical pressure from zero to the maximum angle of deflection. It also gives an angular deflection directly proportional to the electrical pressure applied. In other words, if the voltage is doubled, the angular deflection of the moving system is also doubled, thus making it possible to use an accurate and evenly divided scale.

The American Ever Ready Company, 304-322 Hudson St., New York City, manufacture a number of types and combinations of speed recording instruments for commercial car work. The illustration shows model No. 5, which has a 2⅝ in. dial with a 30 mile scale. This model is fitted with a 100 mile trip odometer with quick reset, and 10,000 miles season odometer. It can be furnished with various types of brackets and also with electric light attachment. This model lists at $20.00. The Ever Ready Speedometer is operated by centrifugal force. All gears and pinions are made of hardened steel and the instrument is designed so that there is practically no wear.

The Forse Speedometer is furnished in two models, Model A, listing at $20.00 and Model B, listing at $15.00. Model A is fitted with a 60 mile, 3½ inch dial, a 10,000 mile odometer and a 1000 trip odometer, with the instantaneous trip reset. Model B is the same as Model A with the exception that it has no trip odometer. The principal part of this speedometer is its governor, which consists of four steel balls held in a cage. As the latter revolves the balls tend to roll outward through the action of centrifugal force, and in doing so push upward a four armed yoke resting upon them. This movement is transmitted to the indicating hand, and when the speed slackens the parts are slung back to normal position by a straight coiled spring. Attention is called to the odometer which is driven by spur gearing. The trip odometer can instantly be reset by one pull of the resetting button. This speedometer can be had for either right or left wheel drive. Special bushings are provided for the sprocket, thus eliminating noise and allowing the use of a steel driving pinion in place of a fibre pinion, which is not as durable but can be furnished if demanded. The flexible cable consists of 12 to 16 strands of fine piano wire, which is claimed to be absolutely noiseless and has no back lash. This speedometer is manufactured by the Forse Mfg. Co., of Anderson, Ind.

The Star Commercial Speedometer, manufactured by the Star Speedometer Co., of Milton, Pa., is designed especially for use on automobile trucks and delivery wagons. It has a 3½ in. dial, 30 mile scale with season odometer or 10,000 miles and repeat and a daily or trip odometer of 100 miles and repeat. The maximum speed hand is controlled by a lock of the Yale type, and the hand can be released only by the key. Two keys are supplied with each instrument and no two speedometers with the same lock. The advantage of the lock is two-fold and should prove a valuable asset to the commercial car user. By its use a check can be kept upon the driver to prevent over-speeding and the unauthorized use of a car can be prevented by this means. The instrument is encased in a highly polished brass case lacquered and the bezel is fitted with French plate glass. The driving shaft is a woven steel wire of 16 threads, 3-16 in. in diameter and the brass flexible shaft cover is of the latest interlocked pattern, which is practically unbreakable and will withstand the strain and vibration of solid rubber tires. Extra heavy bevel gears are used to withstand the hard service inseparable from commercial car work. The instrument lists at $35.00. Centrifugal force is also the principle employed in this instrument. All working parts of the instrument are made of the best grade of tool steel hardened and drawn in oil, all moving parts mounted in ball bearings.

The Veeder Hub Odometer, manufactured by the Veeder Mfg. Co., Hartford, Conn., enjoys the distinction of being the only mechanism which records the movement of the car whether going in a forward or backward direction, which is quite essential on a truck owing to the great amount of backing. As will be noted this instrument is attached to the hub in place of the hub cap, and troubles that are experienced from gears getting out of mesh and brackets becoming loose does not affect this style. The instrument is sealed on to the hub in place of the regular hub cap and cannot be taken off without the owner's knowledge. On a truck it enables the user to figure an exact mileage cost, while on taxicabs it furnishes a means of comparing cabs in respect to their returns and mileage. The instrument is screwed on to the hub and after the set screw has been tightened a seal is put through, the latter being the same as has been used for many years by railroads. The instrument has a trip and mileage odometer. The price of the instrument complete is $25.00. This concern also manufactures a Tachodometer which registers the speed of the machine on a scale similar to a thermometer.

The speed can be easily read as the liquid is always dead beat and does not jump or dance. The odometer registers the total mileage as well as the miles per trip. The liquid is set in motion by a paddle which runs at a speed corresponding to the speed of the car. The Tachodometer lists at $50.00 complete.

THE CASGRAIN SPEEDOMETER illustrated is different in principle from other instruments using springs and magnets. The principle on which it works is as follows:

The flexible shaft connected to the front wheel of a car is connected directly to a rotor or paddle running in a column of oil in the instrument itself. This rotor produces a centrifugal drag or splash of oil against paddle blades attached to the recording dial. The dial is calibrated in separate figures for each mile per hour. As the speed of the car increases, the speed of the paddle in the instrument increases. This increase of speed of the paddle increases the amount of pressure on the dial in direct proportion to the rate of speed of the car. While there is no positive connection between the recording dial and the actuating paddle, yet the pressure is absolutely in direct proportion to the true speed of the vehicle. This column of oil acts not only as a lubricant to the various working parts, but also as a shock-absorbing device.

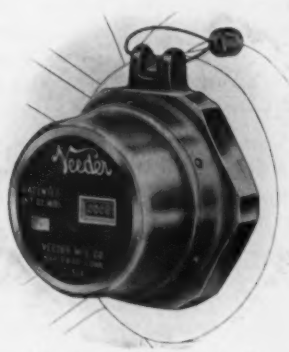
This instrument is made with a 50 mile scale and has also a season trip odometer. It is claimed that engine vibration and road shocks have no effect on this instrument, due of course, to the shock absorbing qualities of the oil and paddle wheel. Every figure on the dial is the same in size. The scale is 28 in. long, the figures being arranged in spiral form, four and one-half times around a 2⅛ in. cylinder. It is impossible for the oil to escape as the instrument is tightly sealed after it is assembled. The dust and dirt can not get on the inside, which is of value especially in commercial car service. The Casgrain speedometer is manufactured by the Automatic Appliance Co., 162-172 Columbus Ave., Boston, Mass., and lists at $30.00.

THE STOVER-LANG SPEED-MILEAGE-METER operates upon an entirely different principle from the other instruments described in this review. Instead of the usual flexible shaft connection or electric cable, the same is operated by air pressure. The Stover Lang connection consists of a rubber tube through which the air is forced in puffs, not a steady pressure, every ½ revolution of the automobile wheel by a diaphragm. This meter is made to register rate of speed by dividing distance by time. The distance is measured by counting the revolutions of the automobile wheel. This is accomplished by moving a gear two teeth for every revolution and must give the exact distance traveled. By means of a clock escapement, automatically wound, five seconds are used as a basis of all calculations. At the end of every five seconds, a count of the wheel revolutions is completed and a new count begun. The mileage meter is connected directly with the gear, which counts the revolutions of the automobile wheel, and must necessarily measure the distance correctly. The trip mileage may be quickly set at any mileage as well as to zero. The case is made in one piece of heavy brass with round corners and edges and contains the speed meter, mileage meter, clock and the electric light, and screws flat to the dash. This instrument complete with clock and electric light lists at $75.00 and is manufactured by the Stover-Lang Co., 219-23 Columbus Ave., Pope Building, Boston, Mass.

THE RELIANCE SPEEDOMETER is also of the centrifugal ball governor type. The features of this instrument are the positive control of a speed needle by the wheel of the car, both in rising and falling speed; direct drive and quick resetting trip odometer, and the removal of all friction, strain and wear by ball bearings in the instrument; flexible shaft and driving mechanism. The dials are individually calibrated to record the actual indications of the testing rooms. The trip odometer registers up to 100,000 miles. The inner scale or trip odometer is printed in red, while the speed indications shown in black can be easily seen from any point of the car. The trip hand has a quick resetting device, one turn in either direction sets it to zero. The instrument illustrated is a model A, which has a 3½ in. face and a 60 mile speed scale. This instrument is manufactured by the Reliance Speedometer Co., 134 Eliot St., Boston, Mass.

Forse Speedometer

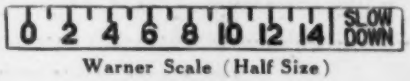
Star Speedometer



Veeder Hub Odometer

The "Casgrain"

THE WARNER TRUCK SPEED INDICATOR, manufactured by the Warner Instrument Co., of Beloit, Wis., is manufactured with either 15 or 30 miles scale. The 15 mile scale is for heavy trucks, while the 30 mile is for light delivery cars. This company contends that an excess of 15 miles speed per hour for a motor truck is a detriment to the latter and quickly reduces the same to a junk pile. With this instrument, there is no excuse for a truck being driven at an unsafe speed, for



Warner Scale (Half Size)

Stover Long Speedindicator

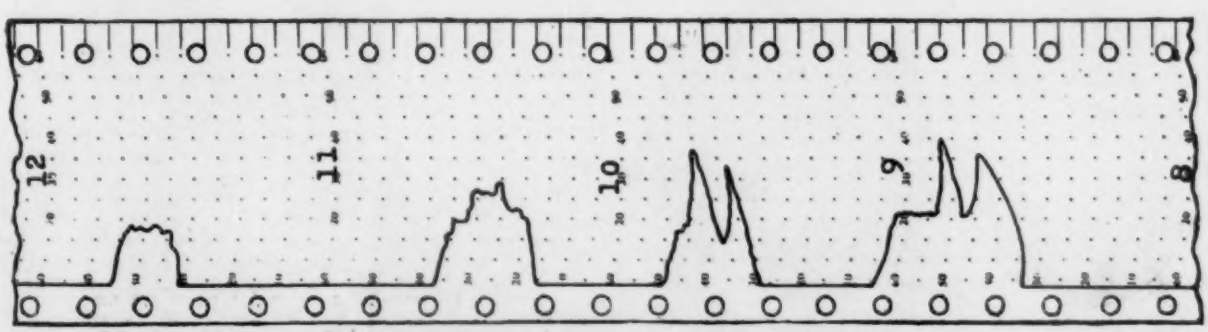
Reliance Speedometer

Warner Auto Meter

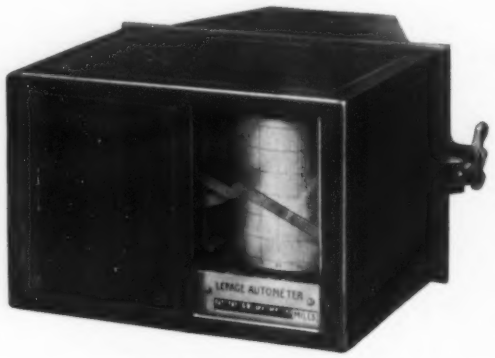
as soon as the truck reaches the maximum speed of 15 miles per hour, the driver is confronted with a big, bold, danger signal in the words "SLOW DOWN." The speed dial is herewith reproduced half size. If the driver goes faster than this, he must do it purposely, and knows that he is injuring the truck every second he does it. At the same time there is a plain readable indication of the exact speed at any instant of the trip constantly in view. The season Odometer registers up to 999 miles and repeats, and the trip Odometer up to 99 miles and repeats. The latter can be set back at any time by means of the milled screw head at its side. This instrument is made on the magnetic conductive principle, utilizing the magnetic pull or "drag," caused by eddy currents in the metallic disc that carries the dial, induced by the rotation of the annular magnet. The strength of the drag is in direct proportion to the speed of rotation. The magnet is made of a special steel containing a high percentage of Tungsten. The magnet rotates in ball bearings. The speed indicating disc is carried on a steel pivot formed to shape and tempered until it will bend 10-100 of an inch without breaking, to secure the maximum stiffness and toughness. The price of the instrument is $50.00, either scale.

The distinctive features of the Renfro Speed-O-Meter is its recording device, which accurately records upon a paper tape, a facsimile of which is shown herewith, the exact movements of the truck. The advantages of this instrument, or rather the recording feature, need no comment, as most any truck user will see at a glance its advantages. The recording tape which is about 1¾ in. in width, is divided up into hours and minutes. The large figures seen through the center of the tape indicate the hours, whereas the figures on the left hand side running the length of the tape are the minute divisions. The figures running across the tape indicate speed. The reproduction shows a record made by a taxicab from the hours of 8 to 12. As will be seen, there were four stops made. The car started at about 33 minutes after 8 and made its first stop at 5 minutes after 9. During this period its highest speed was 40 miles per hour, whereas its average speed was 20 miles. Following the line made by the recording pencil, every speed of the car can be clearly seen. In taxicab work, this instrument should prove of special value to the companies hiring the machines as a clear record is produced and means are thus at hand for keeping tabs on the chauffeur. On this instrument the centrifugal principle is made use of. There is only one large spring which is made of heavy flat oblong steel tempered in oil. A locking device is provided whereby once the record is inserted and the key turned, the instrument is non-accessible to all save the owner. A sliding table upon which the record is carried is so arranged as to be taken out, the record inserted and replaced in a moment's time. The season dial registers 100,000 miles and repeat, while the trip dial registers 100 miles and repeat. The trip dial can be reset to zero at any time by a small push button. The speed dial registers to 60 miles. The instrument measures 7½ inches high and 4 in. wide. It lists at $125 fully equipped, and is made by the Renfro Speed-O-Meter Company, 846 Woodward Ave., Detroit, Mich.

THE BULLARD SPEED RECORDER, manufactured by J. H. Bullard, of Springfield, Mass., is another one of that type of instrument which records the movement of a car upon a paper dial or card. This card is good for 12 hours, when a new card can be inserted and the used one kept for reference if desired. It tells when a stop is made and how long and how fast the machine traveled between stops every moment of the



Reproduction of a Short Strip of the "Renfro" Recording Tape. (Actual Size)



The Lepage Autometer

day. It cannot be tampered with and is operated by a clock movement. A glance at the illustration shows the face of the instrument with the dial in place. This dial is turned by a clock movement and makes one complete revolution every hour in the same direction as the hands of a clock. The dial is divided into 60 radial lines representing minutes, each fifth being heavier than the others for convenience in reading and also registering the figures on the central dial. The anvil A at the lower side of the instrument has a stylus behind it which makes a dot or perforation in the paper for each ¼ mile traveled, each fourth one being deeper to show the completed mile no matter what the speed may be. This stylus is operated by the clock and movement of the car, and is at the extreme outside space when the instrument is set for the beginning of a record, and moves towards the center one space per hour, being moved inward by the clock and requiring 12 hours to move across the dial, where it is no longer operative until reset. The dots on the dial indicate a mile and one fourth traveled in five minutes. On the back of each card a record is kept of the date the card was used, the distance traveled, etc., etc. This instrument complete lists at $75.00.

THE JONES SPEEDOMETER AND RECORDER are manufactured by the Jones Speedometer Dept., United Manufacturers, 250 West 54th Street, New York City.

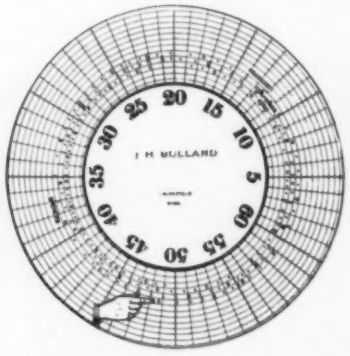
To overcome the effect on, and to insure a steady speed indicating hand, all of the commercial vehicle models of the Jones Speedometers are geared two-to-one, that is, the driven shaft turns twice as fast as the driving shaft. The result is a "dead beat" indicating hand which indicates all speeds without vibration. The Jones Commercial Speedometer is fitted with the new flexible chain shaft drive. It is made with a 25 and 30-mile speed scale and has a 100-mile trip and a 10,000-mile season odometer. The instrument is fitted with a maximum hand and a small flat key lock which prevents resetting of the maximum hand. The latter device gives an effective record of the highest speed attained, while the resetting attachment is locked. The price of the instrument with either 25 or 30-mile scale is $32.50 without maximum hand lock; with lock the price is $37.50.

THE JONES RECORDER is designed to register every movement of the truck or delivery wagon. It tells when the vehicle is used without authority, how long it was out of the garage, and when it returned, how many miles it traveled and how fast. The numbers around the center of the disc represent the hours of one day and the dotted lines indicate these figures extended. The letters across the disc represent the days of the week, commencing with Sunday on the left. The record is reproduced by an indicating point which travels from the extreme left to right, making a plain record daily on the disc, which completes one revolution every 24 hours. The disc is operated by means of a very fine and extra heavy clock movement. When the car is in motion the needle makes a short horizontal crosswise line. Each cross line indicates two miles of travel. When the car stops the needle ceases its crosswise movement and remains stationary, thus showing the duration and frequency of car stops. The disc is meanwhile slowly moving, and this results in an even circular line parallel with the circumference of the disc. This recorder may be used in combination with the Jones Speedometer, and the combination is especially valuable to all operators of motor trucks, delivery wagons and horse-drawn vehicles engaged in delivery service.

By means of the LEPAGE AUTOMETER, the movements of any style vehicle can be recorded in an accurate manner, the various movements being recorded on the paper cylinder contained in the meter. Each oblique line gives the speed, duration in hours and fractions, together with the distance of each trip. Through these three records it is possible to average the speed per hour. Each vertical line gives the time during which the vehicle remains stationary. The cylinder covers a period of seven days, and is controlled by a flexible shaft transmission from the front wheel. Also contained in the Autometer is a clock apparatus which has to be wound but once every eight days. An odometer contained in the instrument records the

Renfro Speed-O-Meter

Bullard Speed Recorder



Fac-simile of Record Disc

The Jones Speedometer

total number of miles covered by the vehicle. This is an important record where tire mileage is taken into consideration. The Autometer is particularly adaptable to commercial vehicles. The list price of the Autometer is $75 with complete attachment. It is sold in this country by the Franco American Taximeter Co., 735 Seventh Ave., New York.

THE EVER READY TAXIMETER, manufactured by the American Ever Ready Co., 304-22 Hudson Street, New York City, contains one of the most essential features necessary in taximeter construction, namely fool proofness. The case of the meter is so constructed that it is practically impossible to manipulate the meter with wire, nail, screw driver, etc., as the meter is sealed and cannot be opened unless the seal is broken. On the face of the meter there are only two readings, namely, the extras and the regular fare. On the back of the taximeter is an accurate detailed record of every movement of the cab as follows. Total number of initial fares; total extras in dollars and cents; total ten-cent charges in dollars and cents; total line miles including tenths of miles; total dead miles including tenths of miles. These meters will run for twelve hours without winding, but they should be wound every morning. With this instrument the initial fare is registered and the clock is placed in operation the instant the flag is pulled down. Extras are registered by turning a knob on the side of the instrument. The clock operates in conjunction with the driving mechanism and registers automatically when the cab is standing still or running at less than three miles an hour. If the cab is stopped for any purpose the chauffeur brings the flag up to a horizontal position and the clock stops recording, but the other mechanism is engaged and will register mileage when the cab starts whether or not the flag is reset. At the end of the trip, the flag is brought down to the horizontal position, thus stopping the clock and not registering added fares, while the passenger is settling for his fare. It also affords the passenger an opportunity to change his mind and continue his journey in which case the meter is reset without registering another nickel fare and extras remain on the dial to be added to it.

The Jones Recorder — Front and Back Views of the "Ever Ready" Taximeter — Henry Lepaute Taximeter

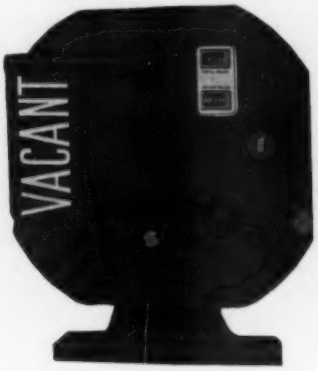
The HENRY LEPAUTE TAXIMETER, imported in this country by Chas. Dien Importation Co., 45 W. 34th St., New York City, is the one most generally used in Paris and the principal cities of England, Spain, etc. A feature of this meter is that of the flag which, the carriage being disengaged, stands in an upright position showing the word "Vacant," both on the flag and dial of the instrument; if pushed even a fraction of a second toward the tariff position, it cannot be brought back to the position vacant without first going around the entire circle, thereby registering once in the upper space marked Tariff, and when in the upright or vacant position it cannot be forced backwards, retrograding, no matter what force is used. The regular fare is registered by the instrument on its face, while in case of extras for trunks, additional passengers, etc., the driver registers these himself by turning a knob at the back of the instrument, which registers it on the front dial in the compartment marked "Extras," and at the same time registers a corresponding amount in another space, thus totalizing all the time, as well as in all the compartments of the back of the instrument. In the back of the instrument there are five indicating dials, namely the Tariff, Regular Fare, Extras, Number of Miles run during day, miles run with flag in position of Tariff, in other words, the number of miles paid for and the number of miles run by the carriage during the day under any position of the flag. A knob is also provided at the back to wind the clock inside the instrument every morning. The face of the instrument gives six readings, namely, the Fare, Extras, Initial Totalizer, Extra Totalizer, Fractional Totalizer. The back of the instrument gives the Total Mileage and the Vacant Miles.

THE POPP TAXIMETER is manufactured by the Franco American Taximeter Co., and leased and controlled in the United States by the American Taximeter Co.. It is claimed to be the first taximeter imported and operated in this country, where it was inaugurated almost four years ago. For several years prior to that time it had been used almost exclusively by the taxicab companies abroad. The Popp meter is made in both "Tariff One" and "Tariff Two" models. The operating flag is located on the side, and in its upright position displays the "For Hire" sign. To register on the "Tariff One" basis, the flag is thrown forward one-quarter of a circle, to almost a horizontal position. This causes the initial fare and the "Tariff One" designation to appear upon the dial. Thereafter, mileage charges will be added from time to time to the fare reading, wherein will also be recorded waiting time when the cab is at a standstill.

Charges register on the "Tariff Two" schedule, upon the flag being thrown to its second position. The initial fare is shown as before and the words "Tariff Two." The meter will thenceforward register at the higher rate for mileage an increase of 50 per cent. over first tariff, i. e., the initial fare for the first third mile and 10c. for each additional one-sixth mile.

Richard Popp Taximeter

International Taxameter
Front View



International Taxameter
Back View

Attention is called to the "Not-Recording" feature with its obvious advantages. It is brought into play upon the flag being operated over three-quarters of a circle, to the extreme point of its travel. This disconnects the clock (waiting time) from the fare reading, which is not added to except upon operation of the cab. "Extras" are rung up by means of a small projecting lever on the side of the meter. Upon payment of the fare at the end of a trip, the flag is returned back through the tariff positions to its upright, "For Hire," position, all records on the face dial disappearing.

The INTERNATIONAL TAXAMETER is of American manufacture and design, and has been approved in all respects unconditionally by the New York City Bureau of Taxicab Inspection, which was created by the City authorities for the regulation of taxicab business. This instrument is not sold, but is rented by the International Taxameter Co., of America, of 1974 Broadway, N. Y., on a monthly rental basis in accordance with the number of meters used. The features of this instrument are accuracy, insurance against dishonesty or being tamper proof, single tariff, automatic non-recorder, separate totalizers for paying and dead mileage, totalizers for individual charges, extra totalizers, fractional totalizer and interchangeable mechanism (so that on short notice it can be made to conform to any taximeter rate ordinance) disappearing flag and flag locking device, special clock movement made expressly for automatic registering of waiting time or shopping tours. The illustrations show the instrument as it appears when in actual service. The flag locking device is almost invisible, and thus prevents mischievous meddling or interference with the register when the driver, for any reason, is compelled to leave his vehicle. The stud or arbor for the operation of the extra charges is so shaped that the handle of the key used for operating the flag is slotted to fit the extras operating stud, thus preventing any one but driver from operating this part of the taximeter as only one key is used for both purposes.

THE JONES TAXIMETER is manufactured by the Jones Taximeter Co., and is leased and controlled in the United States by the American Taximeter Co. It is made in eleven standard models, each registering different sets of rates. The manufacturers are not confined to these rates, merely using them as a basis, since it is possible to conform the registration of the taximeters to any set or sets of rates for distance traveled and waiting time. The instrument is arranged to register both one and two tariffs in one model, and one tariff only in a second model. Provision is made in all meters for additional charge for baggage, etc., under "Extras." This record is rung up by the driver and is shown separately on the dial.

The Jones Taximeter

In model "A" meters all "Extras" are automatically added to the "Total Fare," which fact is clearly shown by the wording on the dial. In model "B" meters the totalizing feature is omitted, the "Extras" being computed separately. All eleven models of the Jones Taximeter are made with both "A" and "B" features. When the cab is disengaged, the flag on the meter is upright, displaying the "Vacant" sign. Upon a passenger being taken, the flag is thrown to the right ninety degrees.

The rear face of the taximeter contains the owner's record. It is permanent and is not returned to zero by the movement of the flag after each trip, but continues to register all additional fares, mileage, etc.

The circular dial in the upper right side shows the number of trips, or times the flag has been operated from "Vacant" to "Vacant." Below this is the permanent cash record, or total amount of fares, including "Extras" received. This is read backward. For instance, the figures 07233 would mean $332.70. The reversing of the reading is for the protection of the owner, preventing the outside public from learning the total amount earned by the cab.

BAKING COMPANY USES AUTOS

One of the largest baking concerns in the country, the Ward-Corby Company, with branches in several large cities, has adopted motor cars for delivery. On account of the nature of the company's output, and the long deliveries, they have found that there is much time saved and other advantages to be gained by the adoption of the motor car. In Chicago, where this company has two large plants, there are in operation about one hundred vehicles, of which about half are motor cars, both electric and gasoline.

Contrary to usual practice, deliveries of bread are made each day, within a radius of twelve or thirteen miles. In the near-by districts two deliveries are made each day. For the distant deliveries electric vehicles are used, the cost of operation being about the same as with horse vehicles, but there is a decided saving in time, a factor when deliveries must be made early in the morning. The average number of stores to be cared for by each driver on his daily route is fifty-five. This makes the number of stops frequent, but there is a considerable amount of time saved, and many advantages are seen over the old method of horse delivery.

These small cars operate at a speed of from nine to twelve miles per hour, and make deliveries with regularity in ample time at the fartherest points. This would not be possible with the horse drawn vehicle. During some of the very deep snows in Chicago this past winter, it is stated, the motor wagons experienced no difficulty in making the usual deliveries, but the horse drawn vehicles had much trouble and often failed to deliver.

This company has found that for its purpose the electric wagon is most desirable for the store routes. For the large trucks the power is gasoline. Owing to the nature of the product, however, electric power does away with the possibility of any odor being taken up by the bread while being delivered.

This company operates its own power plant, and is thus equipped to take the best possible care of its cars.

As a proof that this company favors the motor car over the horse-drawn vehicle, there is soon to be opened in New York city a new plant, which will operate 250 electric and gasoline cars, its entire delivery system. It is but a question of time when the other branches will be operated exclusively with motor cars, as the latter's advantages are being demonstrated each day in a more certain way.

Novel Advertising Auto

Quite recently the Ward-Corby Co. adopted a unique method of advertising its bread. It had manufactured for advertising purposes two immense gasoline motor show wagons. These resemble in many respects circus wagons, being elaborately decorated with gold and life-sized figures. Inside there is an orchestrion, which plays the latest and most popular music. These wagons are sent out in different sections of the city, and give free concerts to the public, stopping now and then at some corner to play several airs. How much they have done to advertise the company can readily be appreciated. The idea is original with them, and has been found very effective.

CONTRACT MOTOR DELIVERY PROFITABLE

Contract motor delivery is a new and very profitable business, affording an unusually attractive field, of which wide-awake business men are rapidly availing themselves. It is found that in various cities throughout the United States, express-wagon companies have from one hundred to five hundred places to call daily, from which they get from five hundred to two thousand packages. They receive from eight to twenty cents apiece for delivery to residences within a radius of six miles.

The horse delivery has been used in this work successfully and many of the firms have grown to large influential companies, but the motor car is more economical and produces greater profits. The Central Motor Company, a division of the United States Motor Company, at No. 3 West Sixty-first street, New York, is the first to construct a motor delivery wagon especially adapted for this purpose. One of these motor wagons, properly handled, can deliver from two to three hundred packages daily, at a cost, including everything, not exceeding $7 per day per wagon.

Because of their stylish appearance and the rapidity with which they make deliveries, fashionable people are pleased to have them stop at their doors, and are specifying that purchases be delivered by the motor quick delivery system. As merchants are anxious to please their customers and many do not have enough packages to maintain their own delivery, the business of contract motor quick delivery is rapidly taking the place of horse delivery and is developing in a manner which indicates that it will be one of the most important branches of motor delivery.

HAULING BRICKS WITH A MOTOR TRUCK

A contractor of Butler, Pa., recently took a contract to build a State road in Pennsylvania, and estimated that $5 per thousand would be his expense in getting the brick to the road. He bought a motor truck with a dumping body and found that his expense of hauling was reduced to 70 cents a thousand. The truck replaced ten teams. The haul was four miles.

COMMERCIAL CAR FOR ISOLATED TELEPHONE WORK

The commercial car of one type or another finds use in about every field, one of the most interesting of which is in isolated telephone work, that is, in the service of telephone companies whose service takes them into isolated districts. Take through the middle Western States, for instance, where roads are none too good. It is hard going on horses, and a

vehicle that can do more than horses in the course of a day is naturally very much in demand. The Bell Telephone Company at Auburn, Indiana, have used for the past three years a two cyclinder, air cooled, high wheeled McIntyre commercial car with very good results. The vehicle shown in the accompanying illustration is in use by the wire crew, one of the members of which is on the pole, while the operator of the car is proceeding slowly, allowing the wire to unreel. In ten months of service the car was in use 184 days, traveled 3972 miles and gasoline and oil for that period cost $99.72. The total cost for repairs for the time was $47.45. The roads over which this car has to travel are hardly of the improved sort, as will be seen from the illustration.

KENOSHA, WIS., ECONOMIZES WITH AUTO FIRE TRUCK

Fire Chief Isermann, of Kenosha, Wis., has given out a statement in which he says that the Rambler fire truck has now been in service five months, during which time it has answered thirty-nine alarms and made as many more trips on inspection runs. The total cost of upkeep for the five months including gasoline, oil and water, was $6.85, or $1.37 per month.

The chief says that it has previously cost the city $1.25 a day to feed, shoe, bed and doctor the single pair of horses which the Rambler fire truck replaced. In this case the cost of maintaining the horse-drawn outfit was nearly as much for one day as it cost the city to maintain the motor-driven apparatus for one month.

THE UNITED STATES GOVERNMENT some time ago purchased a Knox wagon for the District of Columbia Water Department. The officials of the department declare that this wagon is in every way more satisfactory than the horse-drawn vehicle. It is cheaper to maintain and is always ready for service.

GOOD POINT FOR PNEUMATIC TIRES

Pneumatic tires on a motor truck as a saver of front lawns in moving time are recommended by Perry E. Simmons, who conducts an express and moving business in Portland, Me., using a Franklin one-ton truck. The moving season, now on in earnest, will leave many lawns cut and disfigured. Portland will have fewer than usual.

With former methods, when goods were to be taken from a house and placed in a moving van it was generally necessary to carry them down the front walk, as property owners would not permit the van wheels to cup up their soft, green lawns.

When Mr. Simmons started moving with a pneumatic-tired truck, however, he found it an advantage. "I back right across the lawn to the steps," he said, "and easily run the furniture and pianos from the front door right into the rear end of the truck." The tires, 36x5½ inches, do not destroy the greensward, and this method saves a lot of time.

ADVANTAGES OF THE MUNICIPAL SERVICE MOTOR CAR

A great number of municipalities are discarding horse-drawn vehicles of all kinds and adopting motor-propelled vehicles in the different departments. In the April issue of THE COMMERCIAL CAR JOURNAL we spoke about the advantages of the motor fire-fighting vehicle. There are also a number of other city departments which find the motor vehicle an advantage. Motor police patrols are now making their appearance in nearly all the large cities, and have proven more efficient in answering calls and in expense of operation. So also with ambulances.

CO-OPERATIVE DELIVERY SYSTEM

Forty small stores in Pittsburg have placed their deliveries in the hands of a company which has installed a complete motor-delivery system. The concern is operating ten machines. A large pick-up machine makes the rounds of the downtown stores every hour, secures the packages and takes them to headquarters for distribution by machines of lighter capacity, which make six and eight trips a day for stores which formerly only made two deliveries. This service is costing the stores about twelve cents per package.

THE BREISCH MILLING COMPANY has been conducting two tests, the first covering eighty-eight consecutive days and the second an eighteen day test, in which a horse and wagon and the motor truck were used side by side. During the four months the motor truck made 2,171 deliveries in 621 hours, aggregating 925,623 pounds, which is an average of less than seventeen minutes per delivery, 25 deliveries per day and 426 pounds for each delivery. In the four months there were 2,784 miles covered, which is an average of nearly a mile for each delivery. There were used 290 gallons of gasoline and 25½ gallons of oil, the cost of which averaged two cents per mile delivery of 426 pounds each. In the eighteen-day test the motor truck made 418 deliveries in 114 hours, covering 500 miles at a total cost of $8.76, or an average cost of two cents per delivery, whereas the horse made only 132 deliveries in 133 hours, covering 110 miles at a total cost of $7.49, or an average cost of nearly six cents for each delivery.

Points Concerning Worm Transmission

SOME EUROPEAN EXAMPLES

BY OUR FOREIGN CORRESPONDENT

SINCE worm gearing for automobile work has in the past received considerably more attention in certain countries of Europe than in the United States, some conclusions and results from abroad may be useful to many of our readers who are at present debating in their minds the relative merits of worm, bevel, or chain transmission. Therefore I propose to give, in language as far as possible relieved of technical terms, the gist of the conclusions formed in Europe on certain points that have scarcely received the attention they deserve, and also to summarize the results of practical European automobile experience.

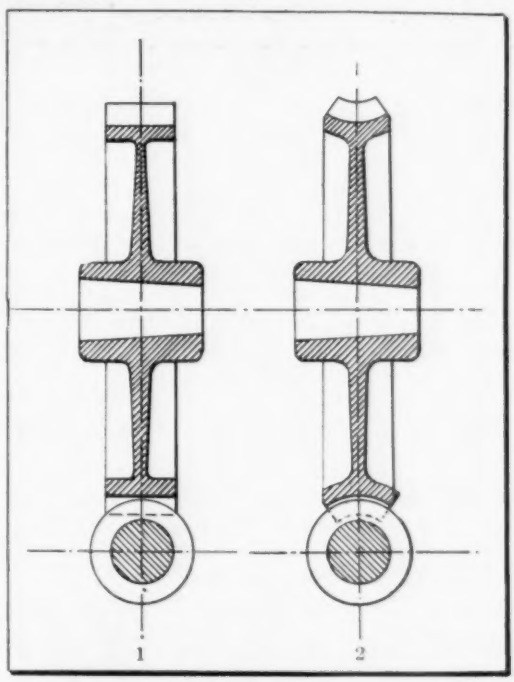
How a Worm Works

As the main purpose of this article is to give a correct general idea of the more distinctive points and peculiarities of worm gear and its working,—sufficient to enable the average man to form some idea concerning the merits of any given design,—I will in the first place ask non-technical readers not to be alarmed at some of the diagrams that follow. They are perfectly simple and are easily understood when explained.

To begin with, we must have a definite idea of what worm gearing really is. It is often described as a rather extreme form of skew gearing, but this is only true of the straight-cut worm gear as shown in Fig. 1. As usually employed, however, the circumferential surface of the worm wheel is curved to fit round the worm (see Fig. 2), and it is this curvature that makes the action of the mechanism considerably more complex.

This brings us to the question of how the worm works, and the matter resolves itself into a study of the behavior of the ever-varying contact between the worm and worm-wheel teeth. This question of worm contact has been dealt with in the most masterly manner in the United Kingdom by Robert A. Bruce, and I am indebted to the courtesy of the British Institution of Mechanical Engineers for their permission to give illustrations from a paper read by Mr. Bruce before that body.

Fig. 3 shows a transverse section of a double-threaded right-hand worm of 4 in. pitch, 4 in. outside diameter and 3 in. pitch diameter, taken from the paper in question, and the next figure illustrates longitudinal sections of the same worm taken along the planes shown at BB, AA and CC, respectively. It will be seen, of course, that the section at CC is exactly the reverse of that at AA. These drawings to begin with show one factor forever varying relatively to any given part of the worm thread.



Figs. 1 and 2. Straight-toothed worm gear,—an extension of the skew gear principle. Ordinary type of worm transmission in section, showing curved end of tooth.

Fig. 5 represents in plan, end and longitudinal sections, a worm of 8 in. diameter and 8 in. pitch with two right-hand leads to mesh with a worm wheel of 4 in. pitch and 30 teeth (the pitch distance on the wheel is obviously only half that of the worm, because the latter is double threaded, and therefore the worm wheel has to provide tooth accommodations for the two threads), and on the drawing the limits of the contact surfaces at any given relative position of the worm and worm wheel are shown by the much-lettered line.

From this diagram it may be seen that the worm thread first comes into contact with the worm-wheel tooth at the point C XI, whence the line of contact gradually extends

to each side like a ripple in the water. As its extreme points become wider apart they also sweep lower down over the tooth surface of the worm wheel until, when the worm thread is half way through its working travel and the teeth of the worm wheel cease to approach the worm and begin to recede (at the center line of the worm wheel in the plan and longitudinal section), the line of contact is represented by the dotted lines QQ. As soon as the contact is past the center of the worm wheel it occurs below the pitch line SS in the transverse section, and this very fact is emphasized in the line QQ, which falls below the pitch line to the right of the center plane of the worm wheel because the leading part of the contact has passed the center line OO in the plan, and is acting on receding teeth, while that part to the left of the center plane OO is acting on approaching teeth that have not yet passed.

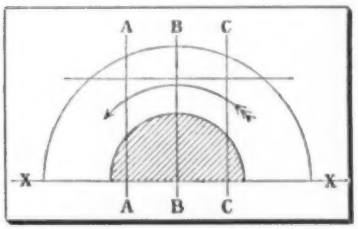


Fig. 3. The worm with three planes of section.

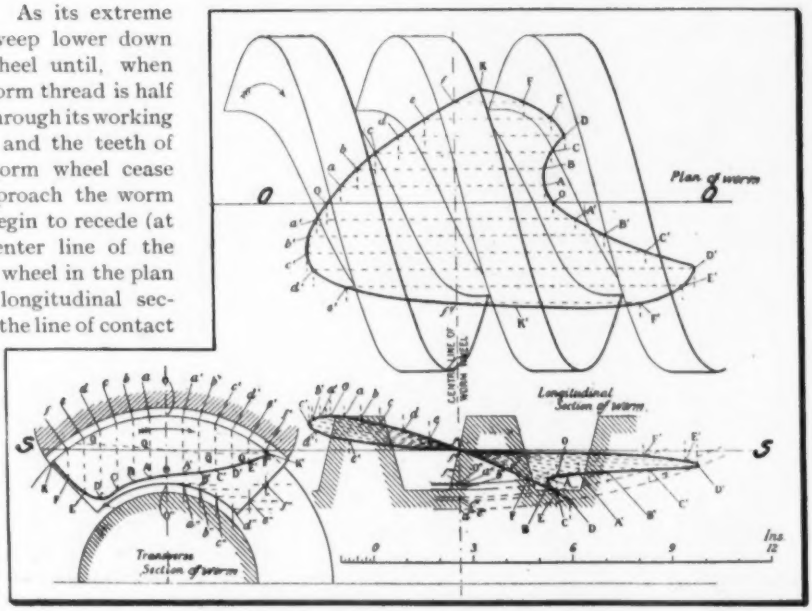


Fig. 5. Limits of contact surfaces in the working of a worm.

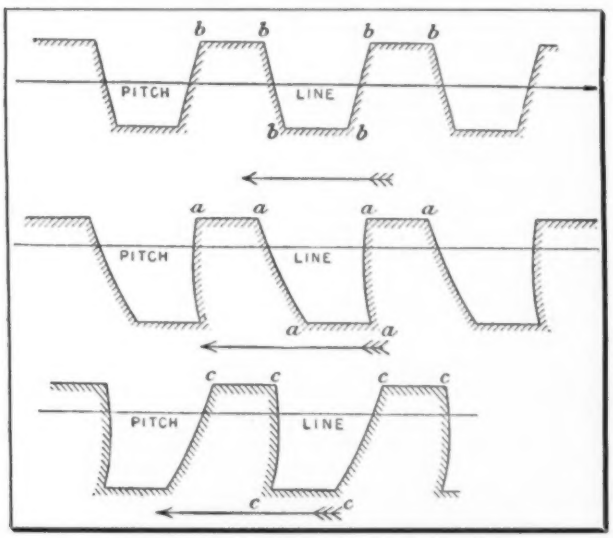


Fig. 4. Sections of worm shown in the preceding figure.

As the teeth of the worm wheel recede, the line of contact falls lower and lower in the end-section drawing. When the contact reaches the point K in the plan, the line begins to diminish in length, the shortening end passing along the line KFE to D. But before reaching that point the line of contact in the end section has sunk with more than proportionate rapidity, so that, when the point A in the plan has been reached, the contact line has died out at A in the end section, and consequently the line has been broken into two portions, the one part shrinking by its one end moving from somewhere between K and F towards D, and the other end simultaneously traversing from A to D, while the other line shrinks at one end along the line AB^1, the opposite end remaining more or less steady at F^1. By the time, however, that the contact touches the point D in the plan, the first of these two lines reaches the limits and ceases to exist, leaving a single much-diminished contact line lying with its end on the line somewhere between B^1 and F^1. This gradually diminishes until it finally dies out at the point D^1, as seen in all the drawings of Fig. 5.

Throughout this explanation I have talked about the "line" of contact. Mathematically, contact of course cannot take place along a mere line, which has no breadth, but it is hardly necessary to point out that elasticity of any material, and in this case viscosity of lubricant, expands this theoretical line into a contact surface of very appreciable width. This factor of width of contact surface may be considerably influenced by the relative curvatures of the worm thread and the engaging tooth section, for obviously two concave surfaces will make better contact than two convex. This point is well borne out by the two Figs. 6 and 7, also taken from Mr. Bruce's paper. These figures, which show complete series of contacts of the worm seen in Fig. 5, also bring out another and important point, and that is, that the line of contact, ever sweeping down towards the point of the worm-wheel tooth in the end section of Fig. 5, has varying values all along its length. The best value of contact is given by the trailing part of the worm (to the left in end section Fig. 5) and the worst at the opposite end of the contact line. To explain this, Fig. 6 shows a series of contacts between worm and worm wheel teeth along the plane dD in the plan view Fig. 5, and Fig. 7 a similar series taken along the plane d^1D^1; the first representing contact on advancing side of the worm as it comes upwards towards the worm wheel, while Fig. 7 shows the

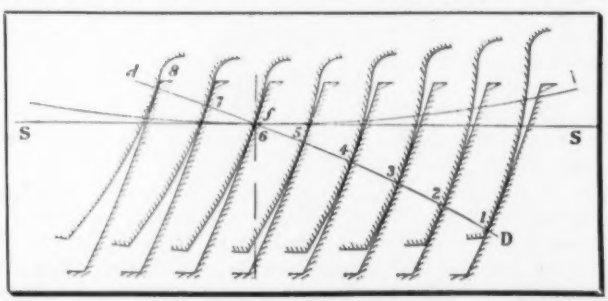


Fig. 6. Illustrating the nature of the contacts along plane Dd in preceding figures. These show large amount of contact on advancing surfaces, and the line dD represents the path of contact.

contact on receding arc of the worm. Although the advancing contact is much less extended than the receding, it is clearly of a kind much better adapted to withstand heavy pressures owing to its concave shape, but the drawings show this so clearly that it is unnecessary to argue the point. It may be added, also, that the increase in the diameter of the worm wheel has a tendency to give increased effective breadth of the contact line.

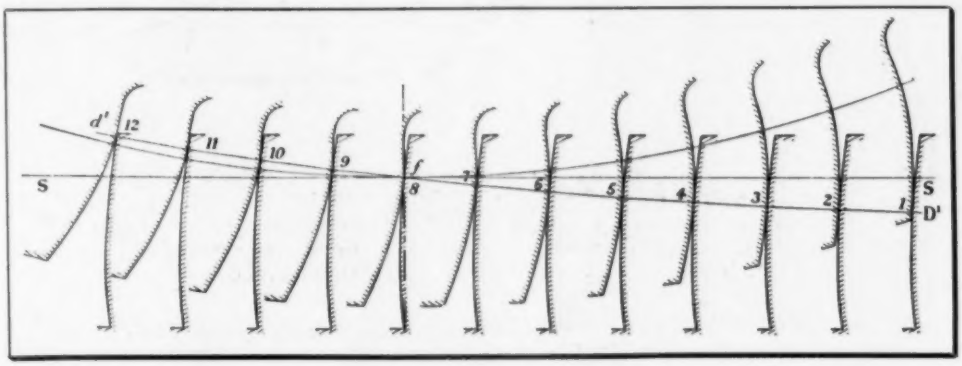


Fig. 7. Series of contacts along plane D^1 d^1 on receding side showing the smaller amount of surface in contact.

To sum up, we may say that while the worm gives very much better contact than a bevel gear on its advancing side, the contact is certainly no better than, if as good as, a bevel on the receding side of the worm, and this, owing to the shape of the contact surfaces; but it must be remembered, too, that, though a certain amount of rubbing contact does take place in a bevel gear, the action is in the main essentially that of rolling contact, whereas in the worm it is one of sliding contact. Also the thrust is more excessive in the worm than in the bevel.

How Worms Used to be Made

Improvements in lubrication and manufacture have, however, gone far to put the worm on equal terms with the bevel. Though Sir Joseph Whitworth patented his hobbing machine in 1835, until within late years worm wheels were cast from wooden patterns. An approximate pattern of the worm wheel was brought as far as possible into gear with the actual worm or a duplicate of it mounted between lathe centers; the rotation of the worm, which was covered with marking, then showed up on the pattern all the high points, which were removed by the pattern maker, and the process continued until the bearing of the worm in the wheel was satisfactory. Within limits this method gave surprisingly good results.

The Angle of the Worm and Coefficient of Friction

Although the worm seen in Fig. 5 is not of dimensions or shape best suited to automobile work, the principle explained in these figures holds good irrespective of detailed dimensions or proportions. As a matter of fact, the worm in Fig. 5 is only at about 20° with the axis of the worm wheel, whereas the maximum efficiency is obtained at about 44°; while, if equal efficiency is desired alike when the worm wheel is driving the worm and *vice versa*, 45° gives the best results and highest all-around efficiency for automobile work. Specific requirements, especially the necessity for suitably gearing down on heavy vehicles affect the question considerably, and on heavy work especially, a smaller angle may be necessary.

The gear is reversible, however, that is to say, the worm is rotatable by the wheel at any angle from 45° down to about 20°; but the angle, of course, affects the efficiency, as also does the coefficient of friction between the worm and worm-wheel surfaces.

This coefficient is, however, largely dependent on the materials employed, and also on the speed of the rubbing surfaces. For automobile work, steel for the worm, and bronze for the worm wheel, are invariably used, the steel worm being, in the writer's opinion, preferably hardened and, as the wearing parts are not subjected to the rough usage of spur gears in the ordinary change-speed gear box, a somewhat deeper hardening can be used with advantage. Case hardening always causes a certain amount of distortion, and so, slightly alters the pitch; therefore the worm, if hardened, should be ground true to form. It is hopeless to expect a rough worm to polish itself in working, as this can only take place at the expense of the worm wheel. The exact quality and composition of the bronze for the worm wheel can only be really decided by experiment. Some bronzes show a very curious pitting on the wearing surfaces, this marking, which has never been explained, consisting of a number of small holes close together, as if particles of metal had been pulled out. As in the case of the worm, particular care must be taken to obtain a good finish on the wheel, for any roughness of the sliding surfaces may lead to trouble. A worm gear should be made as well as possible, or not at all.

A satisfactory bronze for this work usually has a tensile strength of over twenty tons to the square inch, and when a suitable mixture has been found, great care should be taken to keep the quality constant.

As showing how the rubbing velocity affects the coefficient of friction, the following table gives the results of some valuable experiments made by Bach and Roser, which go to show that a worm does not give its best efficiency at low speed. These tests were made with a soft-steel worm working with a bronze worm wheel copiously

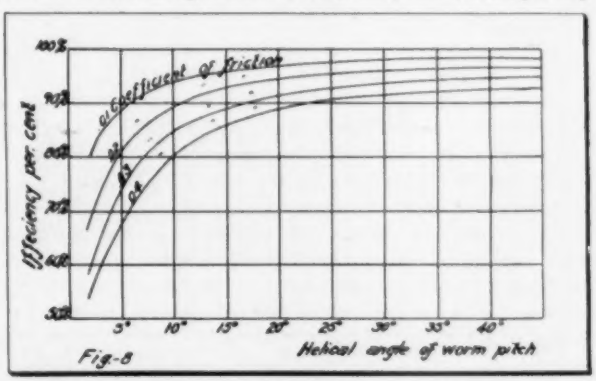


Fig. 8. Diagram showing a series of efficiency tests with worm gearing. These tests show the efficiency of the worm gear alone, without that of its bearings.

lubricated with a heavy cylinder oil. The rubbing velocity is given in feet per minute, and, generally speaking, the final speed of two hundred feet per minute gives about the best results for automobile work.

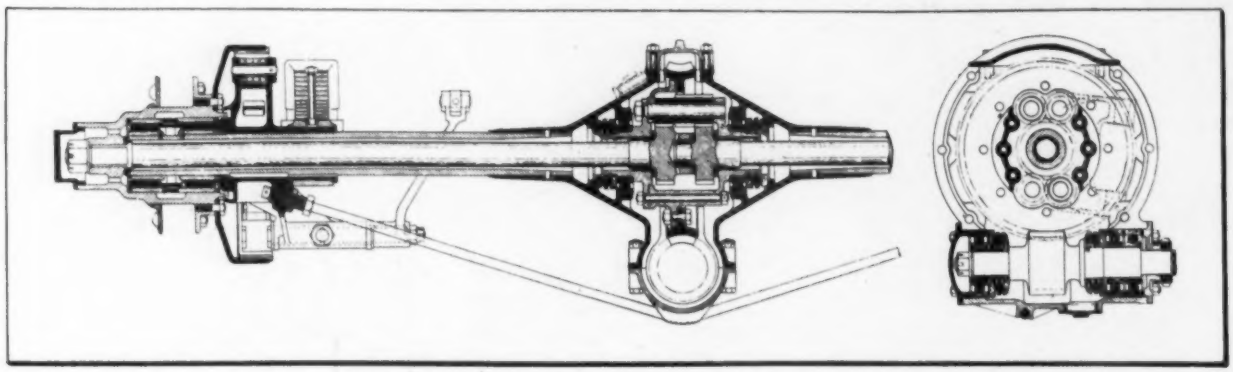


Fig. 9. The Lanchester back axle in end and side section. The Lanchester may be regarded as the pioneer of worm transmission for automobile work

As regards lubrication, the general idea in automobile practice used to incline to the opinion that the worm should lie in lubricant beneath the worm wheel, but several years of experience have taught us that perfectly satisfactory lubrication can be obtained with the worm on top, and as this arrangement gives a much better ground clearance it is being very widely adopted.

Rubbing Velocity Feet per Minute	Coefficient of Friction =
3	0.086
5	0.078
10	0.064
20	0.050
50	0.035
100	0.025
200	0.018

SUMMARY

The combined influence of helical angle of worm pitch coefficient of friction may best be seen in the accompanying diagram (Fig. 8). The tests from which these graphs were plotted, taken in conjunction with others on bevel gear, showed that the bevel transmission had only two per cent. advantage over a worm gear of 45° helical angle.

It is, however, not so much on account of its efficiency as for its silence, that the worm transmission has won its way in Great Britain.

For lighter types of cars the reduction of worm gears usually varies from 3-1 to 5-1, but for heavier types of commercial cars 8 to 1 is an average requirement. These diagrams do not take into account the friction of the bearings, and as the thrust is considerably greater than in a bevel bearing, it is a factor of some importance. Still, with the present-day perfection in manufacture of ball thrusts, something little short of ninety per cent. efficiency can be attained. Some year or two ago a large British motor manufacturing firm carried out a series of comparative tests with a worm and bevel-driven car, and though the results were kept very private the writer has reason to know that ninety per cent. was claimed for the worm and eighty-six per cent. for the bevel. These, however, are results that cannot altogether be considered as representative.

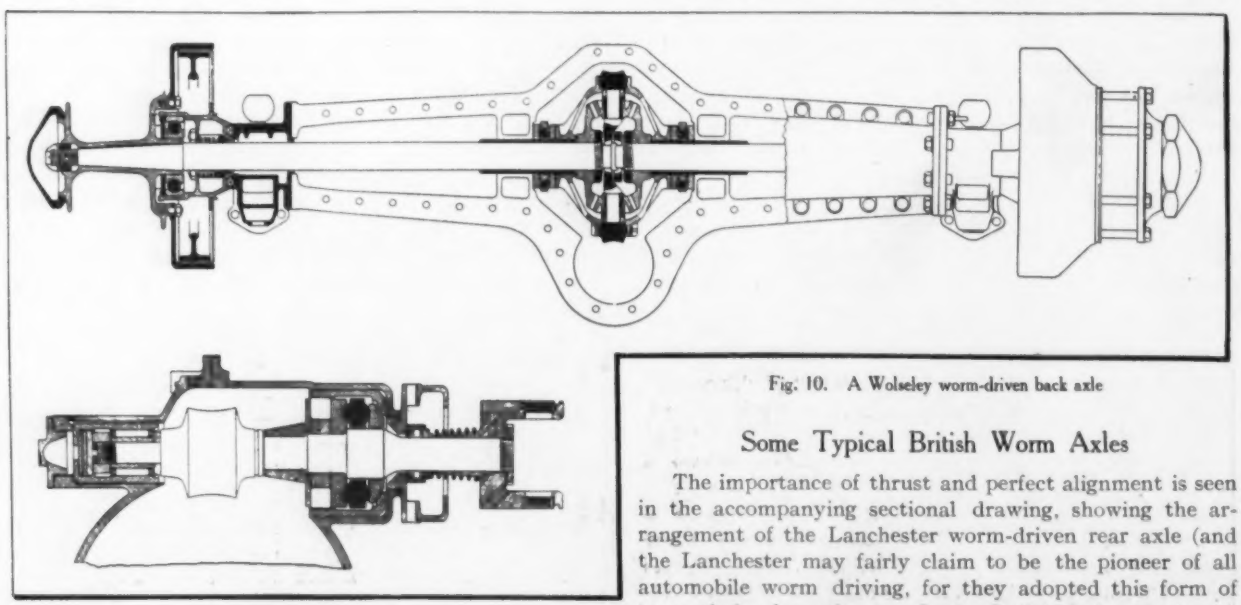


Fig. 10. A Wolseley worm-driven back axle

Some Typical British Worm Axles

The importance of thrust and perfect alignment is seen in the accompanying sectional drawing, showing the arrangement of the Lanchester worm-driven rear axle (and the Lanchester may fairly claim to be the pioneer of all automobile worm driving, for they adopted this form of transmission from the very first). In this design the length of the roller bearing at the back is as phenomenal as the size of the ball thrust at the front.

The other illustration calls for no special remark, beyond saying that the Wolseley car is absolutely typical of the

very best practice in the United Kingdom. The Dennis axle, of which the same can be said, occurs elsewhere in this journal. Both are designs suitable for cab and lighter commercial work as far as strength goes, though from the manufacturing point they might prove expensive.

A Word to the User

One word to the user of a new worm-driven vehicle. For lubricant a good and heavy oil is best, provided care is taken to eliminate grit. After the first hundred miles or so, it is wise to examine the oil for traces of bronze from the worm wheel, for more wear occurs during this first hundred miles than in the next five thousand. Accordingly, the oil should be changed somewhat frequently; at first, till after some considerable amount of use, it is found to remain quite clean. By this time the contact surfaces should have become very highly polished and each tooth in a well-made gear will show a similar bearing. If this is the case it can be expected to run almost indefinitely without further appreciable wear, always providing it is well supplied with good, clean oil of fair consistency.

MOTOR TRUCK FOR TRANSPORTING PRISONERS

An order for a five-ton truck to be used for transporting prisoners between the police stations and the county jail in Chicago has just been placed by the municipal authorities of that city with the F. B. Stearns Company, of Cleveland.

The use of a motor truck for such purposes is something new in this country, although it is in use in a number of European cities. The body of the truck is of special design and will seat fifty prisoners besides the necessary guard of officers. The seats are so arranged that they may be folded up when not in use, and the truck used for regular truck purposes, such as the transporting of furniture, etc.

KANSAS CITY TRUCKS HAVE DOUBLED

"The number of motor trucks in use in Kansas City has almost doubled within a year," says a merchant who keeps his eyes open. "We used to think that our multitudinous hills and steep grades would prevent the use of the bigger trucks, but if you will take the trouble to look around for awhile, you'll find that even the heaviest trucks made are working successfully here and if they can work here, they can work anywhere."

Motor truck dealers corroborate this observation. In all lines of deliveries from department store parcels to lumber, coal and ice, the motor truck is supplanting the horse-drawn vehicle with surprising rapidity. "We intend," says one truck dealer, "to make Kansas City the prize truck town of the country."

A great innovation in the line of a convertible car for suburban and country use is being brought out by Wyckoff, Church & Partridge, of New York. This car, on the Commer chassis, is designed to fill three distinct fields of usefulness. It can be employed as a 'bus with closed top, open top, or no top at all, seating from eight to fourteen passengers, thus filling the needs of estate holders who, upon the arrival of a number of guests, frequently find their regular touring cars inadequate as a means of transporting visitors. It can also be used as a luggage cart, carrying up to two and a half tons, bringing supplies and baggage from the station to the country home. Another use is for long distance touring, a special arrangement being provided fitted with berths, a table, with ample storage room for food and clothing. This type can also be fitted up as a shooting brake, with gun and ammunition lockers.

ST. JOSEPH TO HAVE MOTOR FIRE APPARATUS

"Motor truck fire apparatus throughout," is the ultimatum of the Underwriters' Association of St. Joseph, Mo., given in reply to a demand from the business men and the council of that city for a reduction in fire insurance rates, and, as the result of a long controversy, St. Joseph is planning to comply with the demand.

The differences of opinion between the insurers and the insured have been argued out at length. Every phase of the situation was thoroughly canvassed, and the fire insurance agents decided that, while St. Joseph had as good protection as horse-drawn apparatus could offer, it was not such as to warrant what business men consider favorable rates. The Underwriters, after all other plans had failed, told the city authorities that the quickest and best way to save fire insurance premiums was to bring the fire department up to the highest possible efficiency, and that this meant motor trucks. They showed the complainants where the community would come out ahead by making appropriations for the necessary machinery, and city authorities and business men saw the point. It is expected that the council will soon make the funds available.

BIG COMPANY FORMED TO DISTRIBUTE SAMPSON MOTOR TRUCK

What is known as the first Motor Truck corporation in the south was formed in Savannah to market and distribute Sampson motor trucks in South Georgia and Florida, under the name of the Motor Truck Sales Company, J. H. Haslam and George Denny, of the Georgia Supply Company and Captain William Austin being interested parties. The company was formed to market and distribute Sampson motor trucks with branches at Savannah and Augusta, Ga., and Jacksonville, Fla. The United Motor Atlanta Company, a direct branch of the United States Motor Company of New York, is the distributor of the Sampson motor trucks in the entire south-eastern states. C. Robert Hoyme, assistant district supervisor of the United States Motor Company, was interested in the promotion of the new company.

VELIE SERVICE CAR

"The Boston Service Car" of the Velie Boston branch, has been in constant demand since the balmy spring weather has arrived, and Morton H. Luce has been busy assigning the car to scores of organizations throughout the city. The idea of a service car to be placed at the disposal of the officials of city and State and members of all public spirited organizations was original with Mr. Luce, and has been taken up by the Velie factory branches and agencies throughout the United States. The car is operated by an expert chauffeur, and is loaned by the Velie Company as a matter of courtesy to the people of Boston at all times.

NEW GRABOWSKY MAINTENANCE STATION

The Grabowsky Motor Truck Company, of Toledo, Ohio, was recently formed by factory representative William H. Durphy and others to handle the Grabowsky line of commercial cars in the Northwestern Ohio territory. Temporary quarters have been secured with the Toledo Auto and Garage Company, of Twenty-first street. Plans are being made for a brick garage 60x140 feet to be erected in the downtown district and which will be used as a maintenance station exclusively. It is to be run on a plan similar to one operated in Detroit, where nearly one hundred trucks are stored and cared for.

Lyon Motor Truck Company, of 928 Boquet street, Pittsburg, Pa., has been incorporated with a capital of $250,000. The company will deal in, repair and manufacture commercial motor vehicles, operate foundry, etc. Incorporators: E. P. Douglass, J. G. Douglass and J. D. Chisholm, of Pittsburg, Pa.; Ernest Van Toff, of Wilkinsburg, Pa., and George Wagner, of Bellevue, Pa.

NEW AGENCIES

Skinner Brothers, of Hartford, Conn., have taken the agency for the Commer truck.

The Park Automobile Company, of St. Louis, Mo., has taken the agency for the Morgan truck.

The Whitten-Gilmore Company, of Boston Mass., announces that it has secured the agency for the Adams one-ton truck.

Ernest O. Wheeler, manager of the Commonwealth Motor Mart of Worcester, Mass., will represent the Knox motor trucks on Central street.

The Leyman Motor Company, of Louisville, Ky., has taken the agency for Gabrowsky power wagons for Western Kentucky and lower Indiana.

David C. Fenner has been appointed sales manager of the Alden Sampson Manufacturing Co., the truck division of the United States Motor Company.

A. A. Atwood, manager of the Atwood Automobile Company, of Toledo, Ohio, has just taken the agency for the Federal motor trucks in Northern Ohio.

The Fischer Motor Car Company, 310-16 North Eleventh street, Philadelphia, Pa., has taken the agency for the Atterbury truck for that city and vicinity.

The Morgan-Luse Motor Company, of St. Paul, Minn., has the Northwestern agency for the Stegeman motor truck, made by the Stegeman Motor Car Co., of Milwaukee.

The Graham Automobile Company, 1618 Madison street, Chicago, have taken on the agency in that city of the "Alpena Flyer," manufactured at Alpena, Mich.

The Grabowsky Power Wagon Company has opened a New York salesroom at 318 West Forty-eighth street, under the charge of H. L. Exstein, its former Boston agent.

The Decatur Motor Truck, made by the Decatur Motor Car Company, at Decatur, Ind., is now being handled in Chicago by R. S. Mattoon, general manager of the Lexington, Motor Company.

A. H. Wilson, of North Cleveland avenue, Dayton, Ohio, local agent for the Chase Motor Truck Company, of Syracuse, N. Y., has received three trucks which will be delivered to local concerns within the near future.

M. J. Osborn, until recently secretary of the Schurmeier Motor Car Company, has accepted the general agency for the White commercial cars, and will locate his Northwestern headquarters in St. Paul. Temporary headquarters are with the Bazille garage.

The Taylor Motor Sales Company, of Boston, Mass., reports that it is meeting with great success in marketing the Decatur one-ton truck. Ever since the first car arrived in Boston the company has been kept on the jump giving demonstrations.

F. A. PHELPS COMPANY, of 17 Harvard street, Boston, Mass., one of the oldest and best known stables in the city, has recently taken the agency for the Baker commercial electrics, manufactured by the Baker Motor Vehicle Company, of Cleveland, Ohio.

THE LOCKE-CONE SALES COMPANY, of Toledo, Ohio, has just closed a deal to handle the Adams Brothers Company's line of trucks in Northwestern Ohio. Thomas D. Cone and James P. Locke are the active members of the new concern, which will have salesrooms on Huron street.

A. E. BARKER, general manager of the Universal Motor Truck Co., of Detroit, Mich., recently visited New York city and closed a contract for the sale of Universal trucks in the metropolis. The line will be sold by the Universal Truck Co. of New York. Canadian rights for the sale of the Universal trucks were recently closed for Winnipeg, Vancouver and London.

THE WOLVERINE LUBRICANTS COMPANY, of 80 Broad street, New York City, announces that in order to meet the increased demand for their oils and to insure the trade of prompt deliveries, it has established branches and warehouses at the following places, where a full line of Packard Oils as well as Wolf's Head lubricants may be obtained: Chicago, Ill., 1402 Michigan avenue; Boston, Mass., 224 Milk street; Philadelphia, Pa., 119 N. Front street; Atlanta, Ga., 184 Marietta street.

THE LORD MOTOR CAR COMPANY, of Los Angeles, Cal., are introducing to the merchants and manufacturers of that city the E. M. F. "30" and the Flanders "20" chassis fitted with delivery-wagon bodies. The E. M. F. "30" has a carrying capacity of from 1000 to 1500 pounds and is priced at $1250, fully equipped with open body, or $1300 with panel body. The Flanders "20" has a carrying capacity of from 500 to 750 pounds and sells for $900, with panel body. The Lord Motor Car Company are also introducing the Garford truck.

THE MARVEL CARBURETOR COMPANY, of Indianapolis, Ind., has recently completed arrangements with the Emeis Manufacturing Company, of Davenport, Iowa, to handle the Marvel in that section, also the cities of Rock Island and Moline. The Atkinson-Keith Company, of Toronto, has been appointed agent for the entire Dominion of Canada, Thomas E. Denton at Newark, New Jersey, for the State of New Jersey, and Charles H. Walmsley, 172 Pine street, Rhode Island, for the State of Rhode Island and the Attleboros.

The Truck Salesman Should be a Transportation Engineer

BY E. S. FOLJAMBE

The man who has sold pleasure cars and is considered a good salesman is not always a good commercial car salesman. To be a sucessful commercial car salesman means more than to be successful in the sale of pleasure cars. A glib talker, an affable and persuasive manner combined with a certain amount of deferential persistence, often constitutes the stock in trade of a successful pleasure car salesman.

A commercial car salesman needs these same qualities to a greater or less extent, but must have something more; he must be a man who goes below the surface, one who is not superficial. A knowledge of the mechanism of the pleasure car is often a great assistance to the salesman, but there are large numbers of salesmen who are very successful, whose knowledge of mechanics is most elementary and meagre. A truck salesman should have an accurate knowledge of the details of the commercial cars he represents and in addition, a more or less intimate knowledge of the constructions employed in the cars handled by "His friend, the enemy." This knowledge, however, is used on a customer only toward the completion of a sale, when the prospect has reached the stage at which he is actually comparing the details of one machine with those of another. No greater mistake can be made by a salesman, than to launch into the details of construction, using a lot of technical terms which are in all probability a foreign language to the customer. The average purchaser has been using horses for years, and unless he happens to be an automobile owner he doesn't know what a "chassis" is. Use horse terms rather than automobile terms and much more progress will result. Don't be so taken up with yourself and your knowledge of a machine as to make the mistake of entering into a long exhortation on the advantages of this or that construction. When, however, the customer shows that he has made up his mind to buy a commercial car, then a knowledge of the details of your own and your competitor's truck can be used to advantage.

Don't be a Knocker

The knowledge of the other man's car is very essential when the customer wishes to talk construction, but great care should be exercised not to appear to be "knocking" your competitor's car. "Knocking" is very distasteful to the well-bred high grade man, and will immediately set him against your product. Instead, show step by step, point by point, the advantage your car has over the others in certain constructions. If it has no advantage that is real, steer clear of the subject. Actual merit in a construction, candidly and impartially explained to a man capable of appreciating constructions, forms one of the small weights which go to make up the total which throws the balance in your favor.

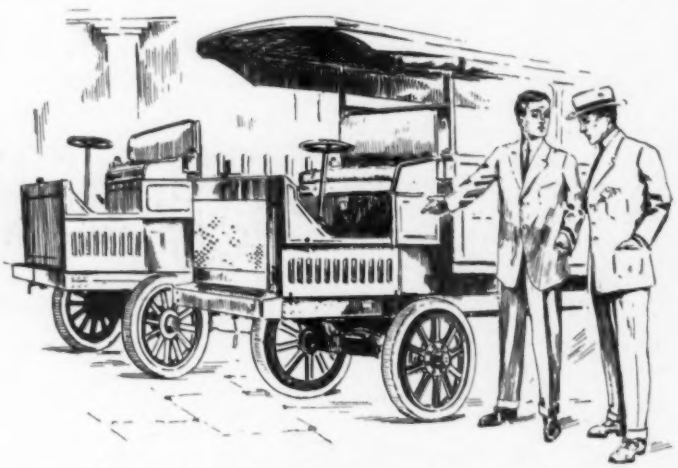
While these details are all right in their place, in nine out of ten cases they do not form the entering wedge for a sale. One of the first considerations is to show the man that you can help him solve his transportation problem.

"You will have to show me, I am from Missouri," applies with much force to practically every commercial car purchaser. He knows nothing about truck operation, maintenance, economy or efficiency; he does not know whether it will require three or five trucks to do his work. He is very likely to think he wants a three ton truck when it will require

a five ton machine to do the work. He is usually skeptical, therefore he must be shown, not only what he ought to buy, but that such an equipment will satisfactorily take care of his work.

Sell Him the Size He Needs

Do not sell him a five ton truck because there is more money in it, if a three ton truck will do all that is required. A well informed truck manufacturer will not appreciate a sale of this kind, for he is looking to future business and not simply to an immediate sale. Sell "satisfaction" not trucks. It is just as bad a policy, however, to sell a three ton machine if a larger one is actually needed. Better lose the sale altogether than put a truck into service where it is a foredrawn conclusion that it will be continually overloaded. As the life of a truck is largely dependent upon keeping its loads within its capacity it is much better to sell a vehicle which will be capable of handling any and all loads, which the purchaser is likely to put upon it. This must not be carried to an extreme, however, as the purchaser, if sold too large a truck, soon realizes that he is paying for gasoline, oil and tires, for carrying around a lot of dead weight for which his competitor with a truck somewhat smaller but suited to its work, is not called upon to pay.



Sell him what he needs, not what he wants. Sell him the size that will do his work economically

Does Not Know the Cost

It is no less surprising than true that a large percentage of prospective commercial car buyers do not actually know what it costs them to do their work with horses, and unfortunately these are the very ones that persist in making the agent show them that the power driven wagon can do the work for less. Here is where the agent must be more than a mere pleasure car salesman, must be in fact a "transportation engineer." The purchaser makes the statement that he can do his work for so much per month per team. Don't take this statement without itemizing it; in nearly every case it will be found that he is not figuring in all of the legitimate costs. It must not be forgotten that the reserve horse must be fed, bedded, stabled, doctored and cared for as well as the horse that is in actual service. It must be remembered that these reserve horses are a large item, as in city work one reserve is required for each team.

Horses depreciate as well as trucks, the average useful life of a truck horse in city service is not over 4 to 5 years. so that 20 to 25 per cent. must be charged off for horse depreciation. If horses are kept at a distance from the store, figure in the time which is lost each day by the horses in getting to and from their work. Even if the garage is at the same distance, much less time is wasted. Point out the fact that a garage can be maintained even in a nice business district without offence, and that the upper stories can be rented for offices or for storage of automobiles, etc., while practically the ground floor is the only part of a stable that can be utilized; the upper part of such a building being unsuitable for business purposes. A large truck occupies a floor space of but about 150 sq. ft., while horses and wagons to do the same work will require from 500 to 800 sq. ft. Be sure he figures in the cost of horses which drop dead, which fall on the slippery pavements and have to be shot, or which have to be sent to pasture for a period. In other words the agent must so carefully study the business and truck requirements of the prospective purchaser, that he knows more about it than the man does himself. Figure in all the costs and it will then be shown that, except in most unusual cases, the trucks can show a saving over the horses.

Other Considerations

Don't, however, make the mistake of basing everything on the actual cost of operation, because as the writer has pointed out many times before, motor transportation is bound to come even if it costs more. Point out to the customer how the trucks will make it possible for him to reach sections in which he practically has no clientele at the present time. Don't forget that an average of about 15 miles per day is the utmost that his horses can do, and those which are hard driven to-day must be rested or given easy routes to-morrow. Show the customer that two machines can easily do the work of five teams, not to speak of the reserve horses and extra men which are required; but do not make the mistake of claiming that the truck can displace more than it is actually capable of displacing; your competitor will be very likely to prove you in error, thus discrediting you with your customer.

Study Each Case

It often happens that the purchaser presents his side of the case and, when the agent has figured up all the costs, allowed for depreciation, etc., the figures look as though he would have a hard time to sell a truck. Now is the time for his expert transportation knowledge to make a sale. A thorough study of the conditions usually reveal ways and means by which a big advantage will be shown by commercial cars. For instance, here is a specific case, a customer desired a truck to haul 25 tons per week of bottled water to the city from a point 25 miles outside. He also desired about two days per week to use the same truck for delivering water, in which case only a small load would be carried. A 3 ton truck would be kept busy most of the time on the regular haul, and although a 5 ton truck would obviate this difficulty by caring for the regular hauling in four days, leaving two days for the route delivery; yet it was not desirable to use a 5 ton truck for this work when less than two tons would

constitute a load on the route. After some thought the agent solved the problem satisfactorily to the user by selling him a 3 ton truck with a special trailer. The long haul was easily made with both truck and trailer loaded, taking care of the 25 tons in an economical manner, and the customer had a suitable sized truck for use with his 2 ton loads on the short route.

Another instance showing that knowledge of conditions means sales, was that of a man who desired a truck for collecting overalls from factories. As these were given to him by the operatives during their noon period, it was necessary for him to be at three principal points within an hour, three different wagons being employed for this work. The question was, how could a single truck be made to take the place of these three wagons? The difficulty was solved very readily by the use of three nests, which were dropped off at the factories and into which the overalls were placed by the workmen, the truck taking on those at the last place and picking up the other two nests on its return trip. One man was required instead of three and the work was done with greater facility.

The ability to suggest novel or unique bodies often forms the solution of a knotty problem with which a salesman is confronted. One man desired to haul so many tons of coal, and at the same time carry a ton of other goods which were in box form. A special body was constructed for taking care of these conditions, and through it a sale was made by the man who studied his customer's conditions, and a sale was lost by the so-called salesman who did not.

Separate Demonstrating Department

It is maintained by certain salesmen that demonstrations should be conducted by an entirely separate department, all such demonstrations being paid for at a set and reasonable figure according to the work performed. These demonstrations could be made by trucks kept for that work, so that every time a wheel turned, money would be earned by the vehicle. When at last such a demonstrator is sold at a reduced figure it would not be sacrificed, having already earned for the agent a reasonable profit on his investment. With this arrangement the demonstration work is an entirely separate deal and is closed as such, whether a sale is made or not. Much of the losses of the truck agencies are due to the fact that they are hauling goods free of charge. The free demonstration custom among agents has led to much abuse of the privilege by supposed prospective purchasers, who really had no intention of buying, at least not for several years, but were perfectly willing to have two, three and four day thorough demonstrations if the agent was foolish enough to give them. Sometimes they had goods which they desired taken on a special trip to a distant point, and succeeded in inveigling the unwary dealer into taking the goods there as a demonstration. There is already more of this kind of graft in existence than the majority are aware of, the agent as a rule being very careful not to say anything which will show that he has been taken in. Fifteen to 20 per cent. commission should give a livable profit if demonstration abuses are eliminated.

Where demonstrations are made by a separate department which makes a business of such work, the men will be much less likely to attempt unreasonable and injurious feats with the demonstrating machine. Just the other day a case was brought to the writer's attention, in which an over-zealous agent actually loaded 23,000 lbs. onto a 1,000 lb. truck, as a demonstration of the ½ ton vehicle. This is a serious mistake and one which is leading continually to trouble after sales have been made. Frequently the newspapers receive and publish publicity matter showing trucks carrying as much as double their rated capacity while on a demonstration, thus leading the prospective user into the very worst error he could make.

From these few suggestions it is very evident that the commercial car salesman must be an expert in the other man's business as well as his own, and if he is successful he will have to figure all the costs for the purchaser. They are very apt to say that insurance is going to cost so much, leaving out the fact that they also insure their horses and wagons, or if they do not, they have to pay for horses which die and are a complete loss. Grain for the horses is often not only purchased, but has to be hauled to the stables. Items of this kind are very seldom included, but take time and cost money. Always bear in mind, however, and impress upon the purchaser, that a real comparison between horses and trucks is not possible, that the business is always built up, increased, better service given, and more satisfaction when motor trucks are used.

POWER WAGONISMS

BY C. L. MORGAN

1. Power trucks are not a luxury nor a speculation, but a gilt edge investment worthy of as careful an investigation as the purchase of a bond.

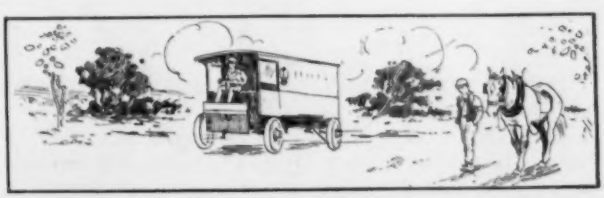
2. Power trucks are an economic, sanitary and commercial necessity. They occupy one-quarter the space, do at least twice as much work as horses for less money.

3. The largest packing house in New York City states that a 3 ton machine, when credited with the sale of the horses it displaces and their operating costs, pays for itself in fifteen months.

4. While the saving of labor—i. e., reduction in pay roll—is the primary object of installing motor trucks, increased efficiency, attractiveness, cleanliness and customers' satisfaction must not be overlooked.

5. One of the largest department stores reduced its cost of delivery by at least two cents per package, representing the net saving of $200 per day.

6. In buying, forget all of the limitations imposed by the horse, and have your only restriction what a man can do in a working day, for this, man's endurance, marks the only limit to power wagon efficiency.



The McKinney Tractor

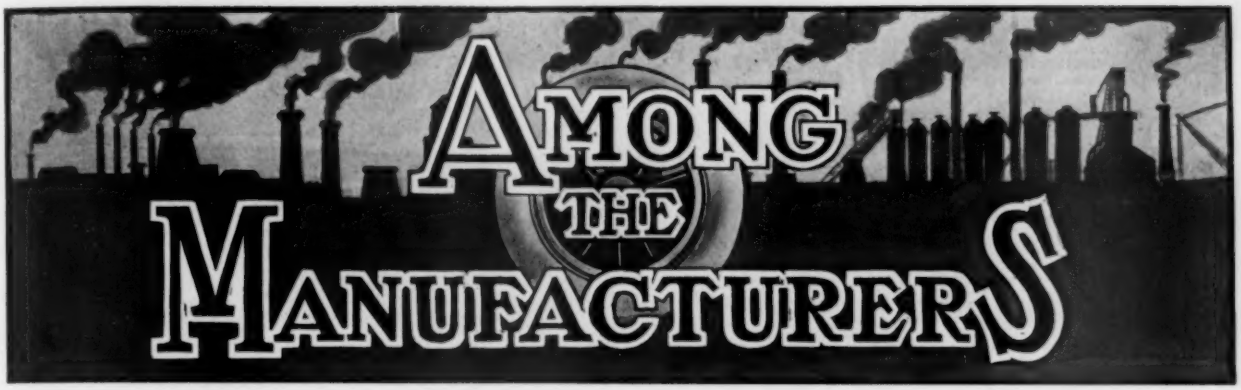
OF the three activities which are the greatest consumers of power—manufacturing, transportation and farming—the last named has been the slowest to adopt mechanical energy. No other single human need requires as much power as tilling the soil. The problem on the farm, therefore, always has been and always will be power.

The employment of the gas power driven machines has offered the only satisfactory solution of the problem. The large gas tractors now extensively used in the West are proving wonderfully successful in the work to which they are

suited and their general usefulness, reliability and economy have been demonstrated. One of the latest productions in this line of machinery is the McKinney traction cultivator, manufactured by the McKinney Traction Cultivator Co., Gainesville, Georgia. In addition to plowing, the flexible movement and tractive qualities of the machine make it desirable for numerous other uses, and practically any work within the range of gas engines can be done with this machine. On the average farm it would never be necessary for the machine to stand idle. Changes in implements can be made in a short time. At the belt its full power is available for threshing, ginning, sawing, grinding, pumping. Implements for mowing, raking, terracing, road grading, etc., can also be attached. The three principal features of the machine are the drive wheel construction, steering device and turning principle.

The machine consists of two large traction wheels in front with a dirigible wheel in rear. Attached to the axle just inside the drivers are two I beams which extend to the rear wheel, giving the frame a triangular shape. The engine and mechanism are mounted over the axle throwing most of the weight on the driving wheels. Power is transmitted from the engine by friction wheels to counter shafts, thence to the drivers by means of gear wheels. The transmission devices are independent of one another. The driving wheels may be checked or locked simultaneously or singly while the engine continues to run. The checking or locking of one wheel does not interfere with the motion of the other. Thus the machine may be steered along the row or caused to describe a short turn on the ground with the locked wheel as a pivot. The operator sits near the center of the machine and controls all movements by a steering wheel, which has connection with the front drivers and rear wheel.

The machine illustrated measures six feet from center to center of drivers and is almost a perfect triangle. The engine is of two-cylinder, two-cycle type, water cooled, and uses kerosene for fuel. Particular attention is called to the construction of the drive wheels. These are twelve inches face and five feet diameter. Treads six inches broad and ten inches long are set at an angle to one another around the face of the wheel, securely riveted to the rims. The outer edge of the treads are bent down, forming cleats for holding on hard surface. The corners are bent over the rims so that there will be little strain of inward pressure on the rivets. A space of two and one-half inches is left between each successive tread so that the soil may pass through without packing hard between the cleats. On bad roads the rims hold sufficiently to the ground to prevent skidding.



NEW TIRE PLANT FOR GOSHEN

J. A. Swinehart, of Canton, Ohio, the well-known rubber manufacturer, has been negotiating with George R. Harper, receiver of the Goshen Rubber Company, for the purchase of the plant on the north side of the Lake Shore tracks on North Seventh street. The plant will be completely remodeled and a large amount of heavy machinery installed. In the new plant rubber tires will be manufactured for electric vehicles, trucks and pleasure cars.

BOWLING GREEN MOTOR CAR COMPANY TRIES OUT NEW TRUCK

The Bowling Green Motor Car Company, of Bowling Green Ohio, recently completed the first of its new line of trucks. The machine is heavier by a few hundred pounds than originally intended, weighing nearly a ton. Instead of having 2½-inch tires, 3-inch are fitted. The motor is rated at 28 h. p. This company has orders for 150 cars booked to be delivered in installments prior to August 1. Most of the trucks will be handled by retailers. Although the Gramm people have agreed to handle the cars through their agencies for a year, the Bowling Green Company is preparing to build up agencies for itself.

WESTMAN MOTOR TRUCK COMPANY INCORPORATED

The Westman Motor Truck Company, of Cleveland, Ohio, has recently been incorporated by S. A. Weisman, L. A. Westman, C. E. Jennings, G. E. Karl and W. H. Westman, with a capital of $200,000. Negotiations are being made with business men of Painesville, Ohio, for the purpose of building a factory in that town. Fifty skilled mechanics are to be employed at first and the number increased as the business warrants it. No stock will be sold, nor will any attempt be made to unload bonds or other securities. A location is desired with suitable buildings as an inducement.

The Mercury Motor Truck Company, of Boston, Mass., has been incorporated with a capital of $100,000; President, W. H. Murphy; Treasurer, C. P. Mooney.

The Fisk Rubber Company, of Chicopee Falls, Mass., has been awarded the contract for equipping the New York City Fire Department apparatus with pneumatic tires.

NEW COMMERCIAL MOTOR TRUCK

A new motor truck has just been announced. It is a light, high-powered delivery car in the low-priced class, and is made by the Lippard-Stewart Motor Truck Company of Buffalo, N. Y.

The Lippard-Stewart truck is unique among the low-priced cars, in that it contains many advanced mechanical features that have heretofore been found only in the big high-priced commercial vehicles. It is equipped with a four-cylinder 25-horsepower engine, selective transmission, full elliptic springs all around, and the new worm-gear rear axle, recently adopted by the English Daimler and in America by the Pierce-Arrow.

TO MOVE FROM JOLIET TO CANTON

Although it has not been definitely decided, it is more than probable that the Economy Motor Car Company, located now in Joliet, Ill., will come to Canton. The present plant in Joliet is being disposed of and if the company is successful in selling stock in Canton it will locate here and probably occupy the present building of the Canton-Hughes Pump Company. The company manufactures motor trucks of the one and two-ton variety, and the reason they selected Canton as a future home, if inducements are offered, is because of the fact that nearly everything that goes into a truck of that sort can be secured in the city.

GARFORD INTRODUCES PAINT OVENS

How to save about ninty per cent. of painting-floor space, as well as from two to three months of interest on the total body cost, has been a problem the Garford Company, of Elyria, Ohio, has solved, and that by introducing a set of paint ovens. The factory engineer states that the entire capacity of the Garford body shop could not afford room for air-dried painting of so many bodies as can be finished on the top floor with steam-heated ovens. With the new arrangement special color orders can be filled through the paint ovens in one week's time, instead of six to eight weeks as with air drying.

Articles of Incorporation have been filed with the State Department by the Phoenix Motor Car & Truck Company, of Brooklyn, N. Y. The capital stock is $10,000, divided into shares of $100 each, and its directors are as follows: F. N. Heimann, M. A. Buell and H. P. Heimann.

VELIE TRUCK MAKES ITS DEBUT

The first commercial car manufactured by the Velie Motor Vehicle Company, of Moline, Ill., made its appearance a short time ago and attracted considerable attention. The machine is twenty-four feet long and has a three-ton capacity. The motor is a four-cylinder and develops 40 h. p. The rear trucks of the machine are of the latest model, they being of double width and carrying two solid rubber tires on either wheel.

PACKARD ENLARGES TRUCK PLANT

In an effort to keep up with the demand for trucks, the directors of the Packard Motor Car Company, of Detroit, have authorized new constructions which will practically triple the capacity of the truck shops. By distributing parts of the work to other portions of the plant the company has been able to produce three trucks a day. The increase in facilities will give the truck shops proper a normal capacity of five trucks a day, which is needed to keep up with orders at the present rate.

GARFORD COMPANY TO MAKE FIRE TRUCKS

The Garford Company, of Elyria, Ohio, has announced that it will at once begin the manufacture of motor-driven fire apparatus, patrol wagons, ambulances, and every such vehicle used in the public service of municipalities. This company will be the first to make such apparatus according to individual specifications, turning out a number of cars of the same type, and with one exception it will be the first to make the fully equipped car. Heretofore several companies have made chasses to which various types of fire-fighting bodies might be added, but the Garford Company will deliver the complete outfit.

In preparation for the installation of this new department the Garford people have sent engineers all over the country. They have discussed the matter with fire chiefs of cities large and small and have watched the operation of the various types of motor-driven fire engines and trucks that have been made as an experiment. In consequence they feel competent to enter this new field on a larger scale than has ever been attempted before.

The designing of the new cars has been done by R. K. Johnson, chief engineer of the public service department of the Garford Company. The chassis is of extra strength and weight. Mr. Johnson has also designed a new wagon for fire chiefs, which is unlike anything ever before made. Realizing that the chief should be the first at a fire in order to direct the attack of his men, the new car is primarily built for speed, but it carries in addition a 35 gallon chemical tank and 250 feet of hose, which may put out a small fire that would otherwise get beyond the reach of a full company in a few minutes.

COMMERCIAL CARS IN WINNIPEG

The commercial car situation in Winnipeg is attracting the attention of manufacturers both in the United States and in England, and a vigorous campaign is being instituted by their representatives in an endeavor to secure a share of the large volume of business that promises to result in consequence of the interest taken by the local merchants in the use of power vehicles.

At the commencement of 1910 only three or four commercial motor vans were in use in Wnnipeg, but the number has steadily grown, until at the present time there are twenty-six in use and a great many more have been ordered for immediate delivery.

The various makes represented at the present time are as follows: Gramm, Randolph, Avery, McLaughlin, Buick, Rapid, Kelly, Universal, Sampson, Van Dyke, Brush, Franklin, Gopher, Chase, Atterbury, American, Packard, Reo, International, Knox, Reliance, Overland, Argyll.

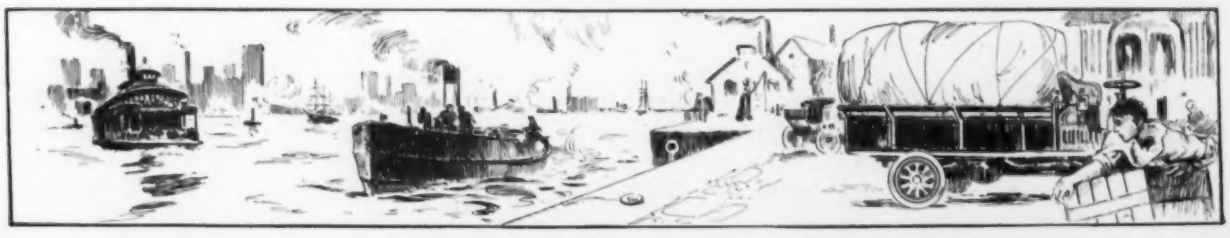
The first users of these vehicles were: Robinson's department store, Ashdowns, Wholesale Hardware Company, Drewery's Brewery, and The Macdonald Company, wholesale grocers. Their experiments with motor vans were watched by a number of interested firms, and as a result of the success with which they met, a great many of the smaller merchants have taken up the use of the power van. The Hudson Bay Company, who own a big chain of stores throughout Western Canada, have also taken up their use, and intend to place a big fleet of vans in service to replace the many horse-drawn vehicles now in use. Their initial order was for six one-ton Franklin trucks, all of which will be used by the Winnipeg store.

In order to stimulate interest in the commercial car, a show has been arranged at the Winnipeg Industrial Exhibition, which is held from July 12 to 22. Particulars can be obtained from the manager of this department, A. C. Emmett, in care of *Free Press*, Winnipeg. Entries can be made any time up to the 31st of May.

Mr. Emmett will have sole control of this part of the exhibition and his appointment as manager has received the endorsment of the Winnipeg Motor Trades Association, whose automobile show he staged last February, and which proved successful from the standpoints of attendance, sales and finance.

As the attendance at the Winnipeg exhibition runs up to as high as 100,000 in a single day, it will be seen that the manufacturer has a golden chance to display his goods to the best advantage.

THE UNITED STATES MOTOR COMPANY will shortly open a new department under the name of the Central Motor Company, to organize a "jobbing delivery service" in various cities. A "Titan" car will be made to meet the needs of this service. The capacity will be 600 pounds and the price less than $1,000.



Commercial Car Converts

B. D. Field, a grocer of Belfast, Me., has purchased an Overland truck.

Bowman Brothers, of Decatur, Ill., have received an Avery tractor. The price was $3,200.

T. B. Wood's Sons Company, of Chambersburg, Pa., has just received a five-ton truck.

The Shay Express Company, of Scranton, Pa., has just received a five-ton Mack truck.

Twining & Ash, of Fostoria, Ohio., recently purchased a truck for the delivery of groceries.

The Witman Company, of Harrisburg, Pa., has a three-ton express-type wagon for wholesale grocery work.

Frank Martin, confectioner, of Sandusky, Ohio, has just purchased a 1911 Sampson Motor Truck.

The Harlem Hospital in New York has ordered a 2000-pound Detroit electric ambulance.

C. L. Jones, of 522 N. Thirty-fifth street, Philadelphia, has just purchased a 1½-ton Buick truck.

Port E. Gibson, a contractor of Cambridge, Ohio, has purchased a 40 h. p. six-ton Stearns truck.

J. R. Carper, of Kendallville Ind., has just received a truck from the Decatur Motor Car Company.

The Universal Automobile Company, of East Orange, N. J., are inaugurating a new taxicab service.

The Fifield Lumber Company, of Janesville, Wis., has placed in service a Monitor one-ton truck.

The Huntingdon Milling Company, Huntingdon, Pa., has recently added a truck to their delivery service.

The Jersey Biscuit Company, of Newark, N. J., has in operation one one-ton biscuit-panel Lansden electric car.

G. A. Lewis, a piano dealer of New York City, has received a light delivery 12 h. p. Reo motor truck.

McDanel Brothers, fish dealers in Ashland, Ohio, have just received a Nyberg Model 8 motor truck.

George. C. Anderson & Sons, of Latrobe, Pa., have received a two-ton White gasoline lumber truck.

The City of Wheeling, W. Va., has just received two Winton auto trucks for use in its fire department.

The Postum Cereal Company, of Battle Creek, Mich., is the purchaser of forty 1,000-pound special express wagons.

Matthews Brothers, druggists, of Scranton, Pa., have received their new Sampson 1500-pound delivery truck.

Mallaird & Company, chocolate manufacturers, have purchased three 1500-pound Lansden electric panel-body wagons.

Omaha, Neb., has recently received its first motor fire truck. It is a combination chemical and hose wagon.

Hamilton, Ohio, has awarded contracts for two motor trucks for the fire department. Each car costs $5,000.

The Central Delivery Company, Tiffin, Ohio, expects to place a motor delivery system in operation by June 1st.

The Mishawaka Manufacturing Company, of Mishawaka, Ind., now have in use a two-ton Lansden electric truck for general haulage.

The C. W. Post Company, of Battle Creek, Michigan, has just placed an order for forty Warren delivery cars.

Martin's Confectionery Store, Sandusky, Ohio, Domestic Laundry Company, Meriden, Conn.,—Atlas wagons.

The American Tobacco Company has ordered from the General Vehicle Company a five-ton electric truck for use at Durham, N. C.

The Harrisburg Heat, Light and Power Company, of Harrisburg, Pa., now owns a service wagon of the one-ton express type.

A Two-Ton Alden-Sampson Truck with special body has just been delivered to the city fire department of Detroit, Mich.

The Wythe Packing Company, of Stratford, Ontario, has purchased a 1200-pound International Harvester delivery wagon.

Kenkor Asoian, of West Andover, Mass., has purchased an auto truck in which he carries daily, to Boston, a large quantity of milk.

George V. Kessler, of Rutherford, N. J., has purchased a twelve-passenger Grabowsky hotel 'bus to be used for hacking purposes.

Chief Buysee, of the South Bend, Indiana, fire department, is expecting a new LaFrance motor fire engine within a few days.

John J. Bagley & Company, the oldest tobacco manufacturers in Detroit, Mich., have recently installed a 1000-lb. light delivery truck.

The first automobile for agricultural purposes in New Jersey has been installed on Lester Collins' farm near Moorestown.

The Eldridge Storage Company, of Atlantic City, N. J., has just taken on another large Garford truck to use in moving household goods.

Bloomington, Ill., has ordered a motor combination fire truck from the Seagrave Company, of Columbus, Ohio, the same to cost about $5,000.

The Tacoma Trading Company, of Tacoma, Wash., has purchased a three-ton Packard truck for conveying building materials.

The Mishawaka Fire Department, of Mishawaka, Ind., has purchased a fire truck from the American La-France Company.

The Boettger Silk Finishing Company, of New York City, now owns two two-ton Lansden trucks, to be used for two twenty-mile round trips per day.

The Massachusetts Homeopathic Hospital, of Boston, Mass., has just installed a Lansden electric ambulance equipped with Edison storage battery.

The Stevenson Truck Company, of Denver, Col., has ordered a fleet of Sampson trucks, ranging from five-ton size to 1,000-pound light delivery wagons.

The Schmulback Brewery, of Wheeling, W. Va., has purchased a three-ton Atterbury truck through the Wheeling Auto Garage, of the same city.

The York Sanitary Company., of York, Pa., has purchased an 18 h. p. 1000-pound delivery wagon manufactured by the Martin Carriage Works.

THE LOUISVILLE (KY.) RAILWAY COMPANY has purchased a 30 h. p. truck, fitted with a movable tower which can be raised or lowered, for trolley wire work.

THE UNION TRANSFER & STORAGE COMPANY., of Huntington, W. Va., recived a Grabowsky commercial truck to be used for moving purposes.

THE OHIO SAMPLE FURNITURE COMPANY, of Cleveland, Ohio, purchased a 1½-ton White truck, which makes daily trips to all of Cleveland's suburbs.

AN AUTO FIRE ENGINE has been received by the city of Wilmington, Del. It was manufactured by the Robinson Auto Fire Engine Manufacturing Company, of St. Louis, Mo.

A SPECIALLY constructed motor police patrol is now in service in Dayton, Ohio, and an automobile ambulance has been ordered. The patrol cost the city $3,500.

KASERMAN & SON, New Philadelphia, Ohio, expressmen, have put into service a light truck which they expect will be followed by others to take care of their entire business.

THE MISHAWAKA WOOLEN MANUFACTURING COMPANY, of South Bend, Ind., is in receipt of a new three-ton Lansden electric truck to be used in transferring freight about the city.

THE WILLIAMSBURG HOSPITAL, of Brooklyn, N. Y., has been presented by its medical staff with an automobile ambulance and a guarantee of funds to maintain it for one year.

THE VICTOR MOTOR TRUCK COMPANY, of Buffalo, was recently awarded the contract for making two 1½-ton motor trucks for supply wagons in the New York Fire Department.

AUTOMOBILE TRUCKS will carry the mail from the central post office to the remote carrier stations in Minneapolis, Minn., beginning July 1st if plans now being formulated are carried out.

F. A. LUDER, a brick manufacturer, has just received a seven-ton Mack truck, which he will use for transporting bricks between the yards of the concern and the Wilkes-Barre market.

POUGHKEEPSIE, N. Y., has purchased a motor police patrol. The new garage at the end of the police station is not quite ready, and the car will be placed in temporary quarters.

THE DETROIT FIRE DEPARTMENT has ordered a two-ton Sampson truck, which is to be used in the telegraph department. The vehicle is to be fitted with a special body and will be equipped with a windlass for hauling cable.

LOUIS NEES, of Guttenburg, N. J., agent for the Steel-Drake Baking Company, has purchased a one-ton panel body Grabowsky truck, which will be used for the delivery of the firm's product along the shore during the coming season.

THE following firms have purchased Gramm trucks: G. Fox & Company, large department store, Hartford, Conn.; S. G. Turner Express Company, Glastonbury, Conn., for trucking between Hartford and Glastonbury; H. T. Smith, of Meriden, Conn.

THE AUTO TRANSFER COMPANY has been organized to operate a line of 'buses between Elkton and Chesapeake City, Md., to carry passengers and express matter. The incorporators are George S. Wooley, James S. Hopper, J. Polk Steel, George M. Bennett and others.

THE ST. HELEN DEVELOPMENT COMPANY has purchased a specially designed two-ton truck having a seating capacity of twenty-four persons and which will be used for transporting prospective land buyers over the company's land in Michigan.

DETROIT has in use forty-two automobiles and trucks and fifteen motor cycles. Included among the former are a police patrol, fire engine, combination chemical and hose wagon and many other department trucks built to meet the requirements of the departments.

O. C. LAUNSTEIN, an Owosso, Mich., milkman, has purchased one of the Owosso Motor Company's trucks for delivery purposes and expects to make the truck take the place of the two wagons he now has in use. Mr. Launstein is the first Owosso man to purchase a motor delivery truck.

C. F. JACKSON & COMPANY, of Findlay, Ohio, will shortly put into service a motor truck made by the Adams Brothers Company, and a delivery wagon made by the Findlay Motor Company. The outfit will supplant several horses, besides giving the firm employing this new mode of delivery a better service.

A BOOST for the commercial car is supplied by a Rossport, Ohio, firm that deals in plate glass on a large scale. The firm purchased recently a two-ton Garford truck strong enough to haul stone or pig iron. They declare it is carrying $50,000 worth of plate glass every week, and has not broken a dollar's worth yet.

THE contract for the new automobile fire apparatus for Irvington, N. Y., has been given. The machine will have forty-six horse power, with a carrying capacity of ten men, six hundred feet of hose and two thirty-five gallon chemical tanks. The tires will be six inches in diameter. The cost is to be $5,000.

THE officials of the city hospital at Indianapolis, Ind., have installed a gasoline automobile ambulance, and as the city dispensary has had an electric ambulance for the last two years, both departments of the city Board of Health are now using motor ambulances. The horse equipment has been dispensed with.

SOME recent Scranton, Pa., purchasers are J. D. Williams Company, Lackawanna Laundry, Matthews Drug Company, Sanker & Williams, C. M. B. Dye Works, Ball Shoe Repairing Company, G. W. Brown, Zeidler's Bakery Company, Hotel Jermyn, Hotel Casey, Ralph E. Weeks Company, Electric and Gas Companies, Fleischmann Yeast Company, Scranton Transfer Company, and many others.

SINCE purchasing a three-ton Garford truck, the Tattersall Company, of Trenton, N. J., has made deliveries of coal at distances never before thought of with the use of horses. Recently three tons of coal in sixty bags were taken to Titusville, a distance of nine miles. The total time required for the trip and the handling of the bags was but two and a half hours. Building lime, sand, cement, etc., are being daily carted to all distant parts of the county.

THE LANSDEN COMPANY reports the following recent sales of commercial cars: Adams Express Company, for use in Philadelphia, Pa. (they have already nearly 150 Lansdens); twelve-passenger 'bus for Olympia, Wash.; a two-ton wagon for the Multnomah Lumber and Box Company, Portland, Wash.; American Meter Company, New York, a 3,000-pound wagon for delivery of gas meters around New York; five five-ton trucks for George Ehret, brewer; Dickinson & Company, Minneapolis, three-ton truck for service between Minneapolis and St. Paul, and Boston Rubber Shoe Company, a repeat order for a platform type of truck to handle both packing cases and crates of shoes.

Peerless Motor Trucks

The Peerless Motor Car Company, of Cleveland, O., has been conducting experiments and tests with motor trucks extending over a period of about five years past, but during that time, however, have not placed any of their truck models upon the market. The announcement made just previous to the Winter Automobile Shows, to the effect that their trucks would now be offered for sale caused much interest in the trade, and the appearance of the trucks was eagerly awaited by all who wished to see the result of the years of development which these leading touring car manufacturers had been devoting to the motor truck problem. A brief description of these trucks, which made their initial appearance at the Madison Square Garden Commercial Vehicle Show, has appeared in a previous issue, but a fuller and more complete description is given herewith.

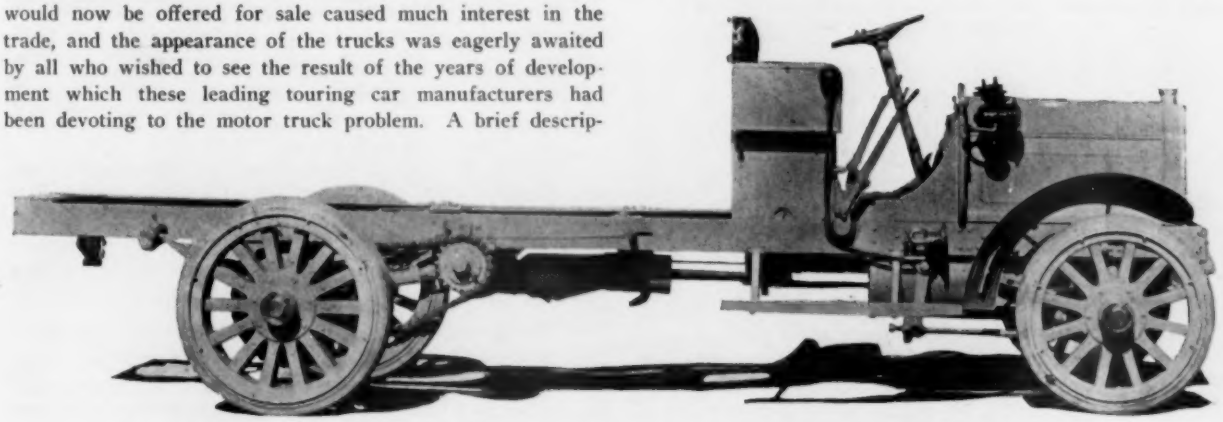


Fig. 1. Three-ton Peerless truck chassis, showing low center of gravity, large wheels, spring suspension, and general simplicity of design

The chassis shows the influence of established European practice modified and adapted to American conditions. The trucks are of the long wheel base type with motor under hood and low hung frame with provision for approximately 80 per cent. of the load over the rear axle.

The advantages claimed for this type of truck are easy riding qualities, accessibility of motor, ease of steering and control, low center of gravity, counteracting tendency toward side sway when operating over rough roads, and ample traction at all times whether loaded or unloaded. The minimum road clearance provided is 11 in., the center of the front axle being the lowest point.

These trucks are built in three capacities, namely: 3, 4 and 5 tons, and several combinations of gear and sprocket ratios are provided on the different models, providing for maximum speeds ranging from 11 to 14½ miles per hour.

The chasses are built in two lengths, providing for normal body lengths of 12 ft. or 15 ft. The wheel base on the standard model is 151 in., and the wheel base on the long model is 174 in. The tread of the front wheels is 68 in. on all sizes, and 71, 73 and 74 in. rear. The wheels are substantially constructed with extra large spokes and are equipped with tires of the following sizes: 3 ton, front 36x4 in. single, rear 40x4 in. dual; four ton, front 36x5 in. single, rear 42x5 in. dual; five ton, front 38x5 in. single, rear 42x5½ in. dual.

The springs are semi-elliptic front and rear, and said to be of an unusually high quality of spring steel, insuring the maximum of strength combined with flexibility. The springs on all models are 40 in. long by 3 in. wide front, and 56 in. long by 3 in. wide in rear, the number and thickness of spring leaves being proportioned to the respective loads carried on the three different models. The riding qualities of these springs combined with the large wheels are noticeably good.

The frame is of channel section 6 in. deep and hot riveted with suitable cross members, the front cross member being curved and forming a bumper in front of the radiator.

On these models the front axle is a drop forging of the Elliott type, with jaw-shaped ends for steering knuckles, and is of I-beam section. The wheel bearings are Timken roller

bearings of liberal proportions. The rear axle is also a drop forging I-beam section, and also equipped with Timken roller wheel bearings.

The steering gear is of the irreversible worm and gear type, with an 18¾-in. steering wheel and 2-in. post, the spark and throttle levers being on a fixed quadrant which does not revolve with the steering wheel.

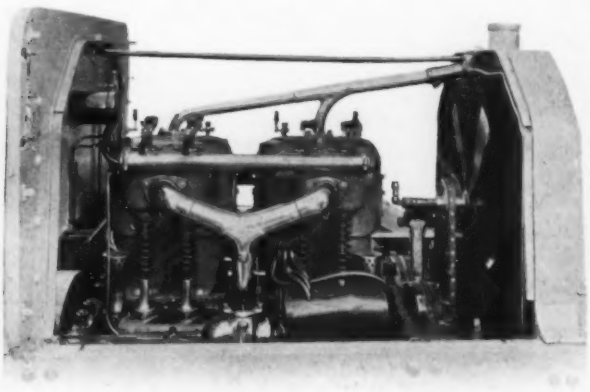


Fig. 2. Inlet side of motor, showing freedom from complicated wiring and elimination of commutator and simplicity of control mechanism

The chassis proper is distinguished by its ruggedness and liberal proportions, but does not give the appearance of excessive or unnecessary weight. The actual weights are 3 ton, 6200 lbs.; 4 ton, 6500 lbs.; 5 tons, 7000 lbs. The photograph of the chassis shown herewith is that of the 3 ton truck.

Motor

The motor is of the 4-cylinder vertical 4 cycle type, with T-head cylinders cast in pairs, inlet valves being on the right and exhaust valves on the left side.

Photographs are reproduced of the inlet and exhaust sides of the motor as installed in the truck, and the simplicity and lack of complication is noticeable. While the type of construction of this motor and its material and workmanship is the same as on the Peerless Company's pleasure vehicles, the motor was, however, especially constructed for the trucks and has a bore of 4½ ins. and a stroke of 6½ ins., giving a rotative speed of 925 revolutions for a piston speed of 1000 ft. per minute. While the stroke of the motor is somewhat longer than has been customary in American practice, it is nevertheless well within the limits of established European practice, and the power and torque curves obtained from tests of these motors show well-sustained power and high torque through a wide range of speeds. Extensive road tests have shown the fuel economy to be entirely satisfactory.

The crank shaft is of large diameter and carried on three bearings lined with Parsons' white bronze of unusual length. The connecting-rod bearings, wrist pins and other moving parts are all liberally proportioned with a view to long life, though the exact dimensions of these parts are not available for publication.

The crank-shaft bearings are supported by the upper half of the crank case, the lower half being practically an oil receptacle, and is readily removable for the inspection or adjustment of bearings.

The ignition system is of the Bosch duplex type, with which our readers are familiar, and the commutator is entirely eliminated, the ignition current, whether from battery or magneto, being through the distributor mounted on the magneto. It is noticeable that all possible complications throughout the construction of the vehicle have been dispensed with, and the number of parts reduced in every way possible.

The radiator is of the same general appearance and type of construction as the distinctive Peerless touring car radiators, but the gauge of the metal used in its construction is heavier, and the cooling surface as well as capacity, is proportionately larger. The suspension of the radiator is by spiral springs inside the chassis channels. Water circulation is by gear pump. The motor lubrication is by splash with constant level in crank case maintained by gear driven oil pump feeding through two gauge glasses on dashboard to front and rear sections of crank case.

The carburetor is of a special design with hot water jackets, auxiliary air, etc., the carburetor being proportioned especially to the motor.

A centrifugal governor operates a butterfly valve between the carburetor and inlet manifold, and limits the maximum speed of the motor. In the photographs the governor connections are shown exposed, but in practice same are entirely enclosed in an aluminum housing, making it impossible to re-adjust without breaking seals.

The fly wheel is provided with fan blades, and same is true of the cone clutch, which is of liberal diameter and wide face, surface being of leather with 33 1-3 per cent. cork inserts. The drive from the clutch to transmission case is by straight line shaft with jaw couplings at each end, and here it is appropriate to mention that in the design of this truck provision has been made for demounting any unit, such as motor, clutch, transmission, steering gear, etc., without demounting any other unit. All controls and actuating mechanisms are very direct and generally in straight and parallel lines. In these respects the truck shows the result of careful design.

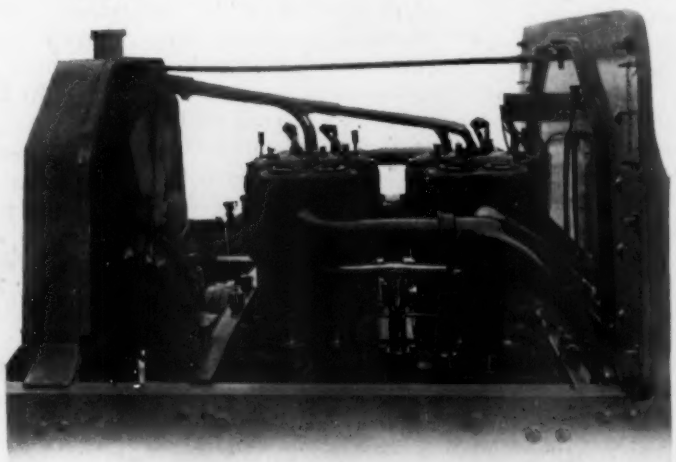


Fig. 3. Exhaust side of motor, showing governor connections, oil feeds and suspension of motor by cross channels by which motor may be removed complete from chassis

The transmission, which seemed to prove one of the most interesting features of the trucks exhibited at the shows, and which attracted much favorable comment, is illustrated herewith. As will be noted by referring to this photograph, the transmission is of the four speed selective type and the face and diameter of gears is unusually liberal. The company states that the reason for using such large gears is for the purpose of insuring the long life of this important feature

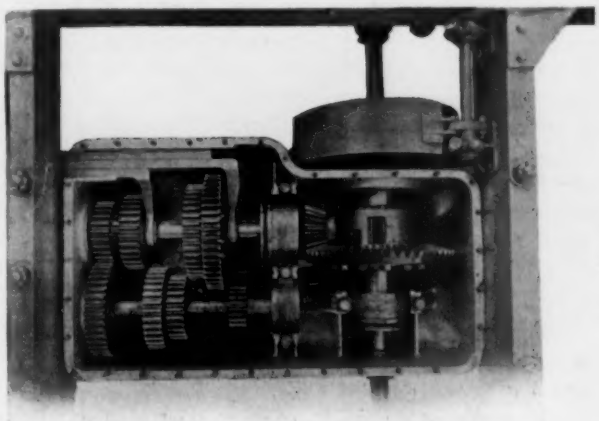


Fig. 4. Transmission, showing suspension by four bolts, simple mechanism for actuating service brake, and liberal proportions of gears, shafts and bearings

of the truck mechanism, and not because such large dimensions are required for strength alone. For the same reason that all the motor bearings, shafts, etc., were liberally proportioned, the transmission gears and shafts were designed with equal liberality, and in this feature again is the European influence noticed.

The four transmission speeds provide for running speeds of 3, 6, 10 and 14½ miles per hour at 925 revolutions of the engine. The lower gear ratios provide for correspondingly reduced speeds. All gears, shafts and working parts in the transmission are suitably heat treated and ground. Radial ball bearings of unusual size are used and thrust bearings are provided when necessary.

The differential housing projects through the transmission case and carries the service brake drum which is 14 in. in diameter. The contracting Raybestos-lined band is operated by foot pedal. The emergency brakes are expanding shoes operated by lever and cam, and expanding in the brake drums, which are 18 inches in diameter. Whitney roller chains are the standard equipment, driven by sprockets carried on radial ball bearings at end of jack shafts. The rear wheel sprockets are bolted to the brake drums, which in turn form an integral part of the wheel hubs.

The torsion rods are drop forgings with provision for adjustment for stretching of the chains, and designed with a universal motion permitting any movement of the rear axle with reference to the frame without throwing strains on jack shaft hangers or other parts.

Five Ton Model

The five ton model utilizes the same power plant as the three and four ton models, but the gear ratios provide for lower speeds as before noted. The rear axle is of a larger section; the frame channel, while of the same depth as in the other model, is heavier; the wheel bearings are increased in size as are the brake drums, sprockets and chains. The braking surface is also increased.

The lubrication of all wearing surfaces such as spring eyes, shackles, control and operating mechanism, is provided for by compression grease cups.

The Metallurgical Dept. of the company specifies the analysis of materials used throughout the construction of the trucks as well as the heat treatment to which same are subjected, and makes all necessary tests on finished parts insuring uniformity of product. When finally perfecting these trucks for the market, test machines of the 3 ton size were constructed, and after being loaded with 4½ tons, representing a 50 per cent. overload, were put on the road and run not less than 100 miles per day. An observer accompanied each truck to see that same came to a full stop every mile and to detect any defects in operation, also to preserve records of gasoline and oil consumption.

After these tests had continued for several months, the trucks were disassembled and micrometer measurements made of all wearing parts, so that any indication of excessive wear could be corrected by providing larger wearing surfaces or modifying the analysis of the materials or subjecting same to improved heat treatment.

Fig. 5. Four-ton Peerless truck loaded with 4½ tons of sand in bags starting on trip from New York to Philadelphia. Photograph illustrates the possibility of installing low bodies on the low hung chassis. The top of platform is only 38 inches from the ground

Since the regular stock product of the company has been placed on the market, these test trucks have been placed in the regular service of the company, transporting materials and in general work around the factory.

Several long-distance runs have been made by the regular stock trucks since the automobile shows, one run being made from New York to Philadelphia at the time of the show in that city for exhibition purposes, and a

photograph of the truck in question, which was one of the 4 ton models, is reproduced herewith. This run was made on January 24th, and the return run January 27th.

The average rate of speed was found to be 12 miles an hour between the two cities with a gasoline consumption of 5.26 miles per gallon, with a load of 4½ tons of sand in bags.

More recently a 3 ton truck was run over the roads from New York to Albany in one day, and the results were equally satisfactory, although the roads were in extremely bad condition.

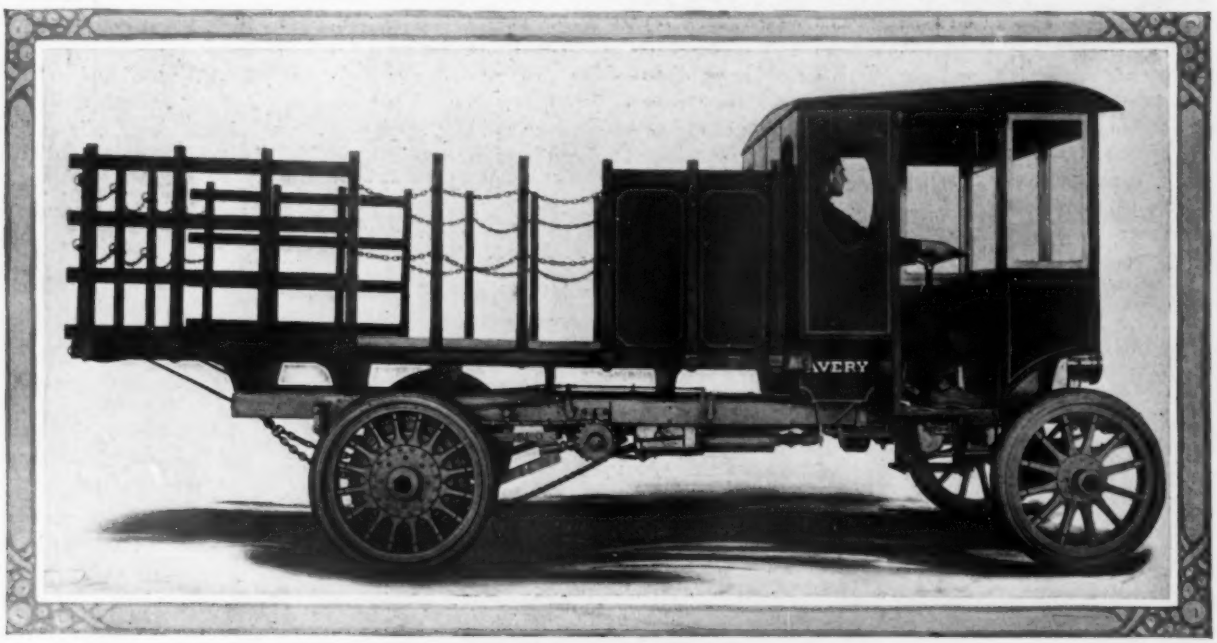
The production of these three models of 3, 4 and 5 tons capacity makes it possible for the prospective purchaser to select a machine of exactly the carrying capacity which his business requires, and the Peerless Company are using every means to discourage the overloading of any of the trucks, notwithstanding their liberal proportions and ample factors of safety.

The three models in either the standard or long wheel base list at $3500 for the 3-ton; $3800 for the 4-ton and $4300 for the 5-ton chasses with driver's seat, two oil dash lamps and tail lamp, combination odometer and speedometer, horn and a very complete set of tools.

Avery Trucks and Tractors

BY E. S. FOLJAMBE

The Avery Company, of Peoria, Ill., have for years been manufacturing a well known line of farming implements, having established their business some 35 years ago. For the last three years they have added to this line motor driven trucks and tractors, and at the present time are probably the largest manufacturers of traction machinery in the country. Their automobile trucks are known as the Avery, these machines being built in from two to five tons capacity.



Avery Truck with Coupe or Cab for the Driver
Note chains under rear for hauling trailers, etc.

The Avery truck is a unique vehicle, in many respects, being not only a tractor, but also a thoroughly serviceable and durable truck in itself, so that any kind of machinery can be driven from the power of the engine. These machines are used for plowing, seeding and pulling harvesters, the machine being capable of drawing two at one time, and can then be used for threshing the harvested crop.

Details of the Avery Tractor

The general chassis arrangement of the tractor and the trucks is practically the same with the exception of the wheels and body equipment. We will therefore take up the construction of the tractor, dealing with the body separately. The layout of the chassis, is on the lines of accepted practice, that is, the four cylinder motor is mounted on the front directly on the main frame. Drive is from a multiple disc clutch to a three speed and a reverse selective gear set, mounted in combination with a jack shaft, the final drive being through Diamond roller chains to the rear wheel sprockets.

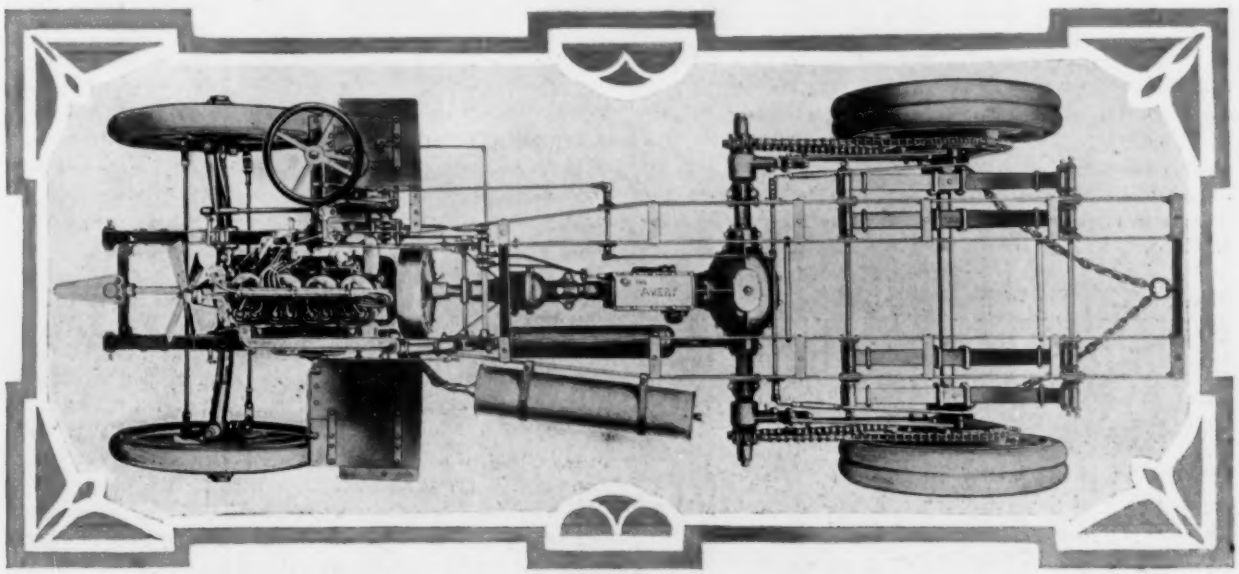
Special Features

Briefly the special features and those worthy of separate description, are the arrangement of the frame members, narrowing at the front to a width of only 22 in., while at the rear the frame is the usual width. This gives a sort of three point support and relieves the frame of stresses due to negotiating uneven ground. The frame is made of perpendicular webs, spaced by short cast cross members riveted between them. In addition to this there are a number of bolts through tubes from side to side. These space the vertical webs which

are drawn tight by the bolts. This makes a very rigid construction, very similar to that of a bridge and one which will carry great loads. The frame is also tied together by the engine at the front, where the frame is unusually rigid, owing to its narrowness, also by the jack shaft at the center and by another bar at the rear, the outer ends of which support the spring shackles.

The motor is flexibly mounted, that is, over each of the integral supporting arms of the crank case, is a stiff coiled spring, so that weaving of the frame does not strain, distort or have any tendency to break the engine supporting arms.

The clutch which will be described in detail, is a special feature, also a prolongation of the engine shaft at the forward end which is provided with a belt pulley, so that implements can be belt driven from it, and also the wheels, which are of a



Plan of Avery Tractor

Attention is called to the peculiar frame made of vertical plates of steel

very unusual type. At the rear heavy chains are anchored at each end of the rear axles and brought together at the middle into a ring for towing purposes, this arrangement being such that no sudden jerking of a towed implement can spring the rear axle. When not in use these chains are hooked up from a cross member in the rear.

The Floating Multiple Disc Clutch

The clutch is of the multiple disc type, there being 13 steel plates, six of them which are 13 in. in diameter are fastened to the fly-wheel and revolve with it by means of notches in their periphery, engaging studs from the fly-wheel, while seven of them, 12 in. diameter connect with the shaft by means of six studs on the rear head plate, which is Woodruff keyed to the shaft. All other keys throughout the construction are machined integrally with their shafts.

The clutch plates are centered by a prolongation of the rear end of the engine shaft. The plates are not forced into engagement from one end, but are drawn together by the forward and rear head plates, between which they are gripped; therefore, there is no end thrust either on the engine or on the shaft running to the transmission. This is accomplished by having the coil act against a collar on the shaft connected rigidly to the forward head plates, while the other end of the spring forces forward the rear plate gripping the malleable discs between the front and rear plates. These plates, of course, run in an oil bath.

The Motor

The motor is of the four cylinder vertical type, designed and built in the Company's factory, as are all parts of the Avery machines.

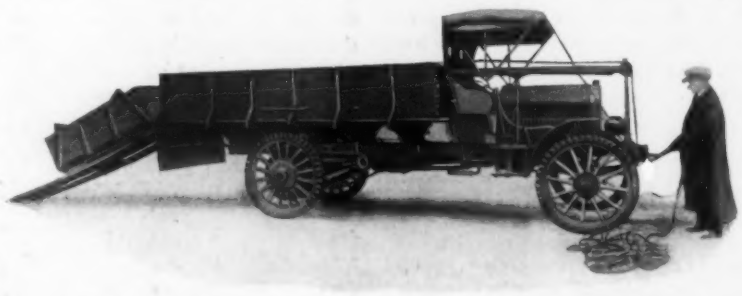
The cylinders, 4¾ by 5 in., are cast separately with valves on one side and water jackets cast integrally. Just below the jackets the cylinders have cooling fins. This arrangement of jackets and fins gives practically uniform cooling, especially as the cylinders are separate.

The crank case is the standard type, cast of aluminum, horizontally divided at the centre and supported by four integral arms at the upper half of the case. There are four large hand hole plates, 2 on each side, one of these carrying an oil filler pipe, acting as a crank case relief or breather pipe.

The crank shaft, which is 1¾ in. in diameter, is a high carbon steel forging supported in 5 phosphor bronze bearings. The fly-wheel is mounted on an integral crank shaft flange by 7 bolts. The half time gears at the front are steel against bronze, separate cut teeth, and are encased, being open to the splash of the crank case. The cam shaft is on the left, all cams being machined integrally with the shaft and finished by grinding. It is supported in five phosphor bronze bearings of split type and is removable when the lower half of the crank case, which is an oil pan, has been removed.

The nickel steel valves are interchangeable. The valve mechanism consists of short hardened steel arms pivoted near the center of the case, the other end of these arms bearing directly on the cams. The ends of these arms engage the lower ends of the vertical valve lifting rods, which operate in bronze guides. Over the head of each guide there is a cap, which moves with the rod, sliding on the outside of the guide, preventing oil from oozing out.

The rods are adjustable in length by means of the usual hardened cap screw and lock nut. Coiled springs are employed on the valve stems, the pistons being of the usual gray iron construction with a flange at the lower end, giving them additional strength at this place, and are fitted with 5 eccentric diagonally cut piston rings, 4 above the pin and one over the end of the piston pin to prevent it from moving endways; oil grooves are cut in the lower end of the piston. The piston pin is of hollow steel, hardened and ground to an accurate fit, and has its bearing in bronze bushings in the piston bosses. The upper end of the connecting rod is split and by means of a clamped screw, grips the centre of the pin. The connecting rods are I-section drop forgings. The big end bearing is of the usual split type, the cap being held by 2 hard bolts, castellated nuts and cotter pins. The cylinders are provided on the right side with removable screw plugs to facilitate cleaning.



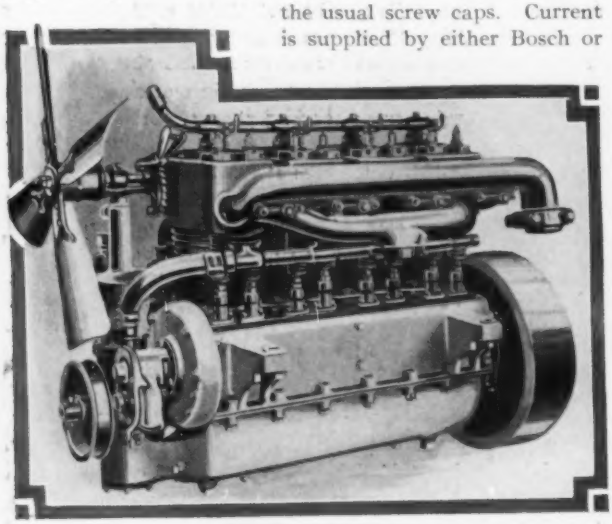
Heavy articles—boxes, pianos, etc., can be loaded on the truck by the power of the engine. This is done by means of a nigger head placed on the motor shaft and two pulleys for carrying the rope

Constant Level Circulating Oil System

The oiling system consists of a constant level oil pool which supplies splash and also by a direct feed of oil to each of the main bearings. Below the crank case member is an oil well which contains 2 gallons of oil. A small gear pump at the front at the lower end of a bevel gear driven vertical shaft, forces the oil through a pipe on the inside of the case, the oil spurting out in a stream from holes in this pipe, arranged opposite each of the connecting rod ends and main bearings. This oil forms the splash pool, the level of which is maintained at the proper height by overflow holes in the side of the case, which conduct the surplus oil back to the well at the bottom.

Ignition

Two systems of ignition, each with a distinct set of spark plugs are provided. These plugs are over the valves in the usual screw caps. Current is supplied by either Bosch or Eisemann magneto mounted on an integral bracket, one on front of the motor on the right side and driven by a shaft with flexible couplings from a spiral gear meshing with a gear on the vertical shaft, the upper end of which carries the timer and the lower end the oil pump. A storage battery supplies current to a quadruple vibrator coil on the dash. Either system can be connected to either set of plugs, so that it is not necessary to stop and clean plugs while on the road.



Avery Motor, upper part of cylinders water-cooled, lower portion air-cooled

The Engine Governor

A Schebler carburetor is used, gravity fed from a 23-gallon tank under the front seat, and it is fitted in addition to a sliding sleeve throttle operated by a hand lever on the wheel, with a throttle connected by links to a governor. This is so arranged that it holds the engine to any predetermined revolution for which it is set and locked, the usual setting being 1200, as there is no advantage in running the motor above this speed, while considerable damage might be done by unnecessarily racing it. The action of the governor, contrary to usual practice, operates to control the engine at whatever speed it may be running, due to the hand throttle setting. Thus, if the hand throttle permits a speed of six miles per hour, the truck will maintain that speed up to the capacity of the engine, but if suddenly the engine is relieved of this load, the governor will prevent it from speeding up. This governor consists of three plow-share-shaped weights restrained against centrifugal action by small coiled springs, their upward movement engaging by means of their plow-share shaped ends, a coned, splined collar forcing it against a ball thrust bearing, the outer ring of which, by means of pins, moves an arm which is connected to the throttle on the carburetor. This governor controls the mixture on its way to the cylinders.

The engine is cooled in the usual manner, a gear pump being used. A peculiarity of the cooling system is the use of a 10 gallon tank under the left of the body, into which the water from the radiator passes, and from which the pump draws its supply. This gives a large volume of water, providing ample cooling as needed by vehicles of this type, especially when doing tractor service with the truck moving slowly and the engine running at high speed. This is also useful when the engine is being used to drive farming implements. A four bladed fan, flat belt driven is mounted on a bracket fitted with a hand ratchet, so that the tension of the belt can be instantly adjusted. A honey-comb radiator is used.

Change Gear and Jack Shaft

The jack shaft is bolted to the front of the differential housing, the change gear case at the front of which has a tubular housing ending in a spherical casing enclosing a universal joint which connects with the clutch shaft and runs in oil. The change gears are of chrome nickel steel, heat treated, 1¼ in. face, the sliding members operating on a shaft with four integral splines. The gears are 6 in. pitch, while the bevel pinion is 3½ in. pitch, giving an unusually substantial tooth. Both

shafts are mounted in Timken roller bearings. The bevel pinion is supported at both ends at the rear, having a plain bronze bearing. The differential is of spur gear type, mounted on Timken bearings which are used throughout the counter shaft. This countershaft is slung to the under side of the frame by special hangers. The 13 tooth driving sprockets are forced onto taper ends of the countershaft and keyed, a lock nut being used at the outer ends. This countershaft is large, being 2 in. in diameter. Drive is by roller chains to 57 tooth rear sprockets, which are annular rings bolted to flanges of the 20 in. cast steel brake drums. Each drum is carried by through bolts passing through the spokes and the hub flanges. The brackets consist of two expanding shoes faced with Raybestos. They are expanded by a double linkage and operated by the right hand lever through steel rods to single-tree type equalizers. These drums have a face of about 3 in. The outer ends of the countershaft are also fitted with expanding brakes on a 12 in. drum of 2 in. width, these brakes having the same general construction as the large brackets at the rear.

The Tractor Wheels

The wheels are of the artillery type with steel tires, into which are set 2¼ in. hard wood plugs staggered in two rows, and are 42 in. in diameter, this tread giving unusual gripping qualities on dirt roads. These wheels at the rear are fitted with a special spike device to get traction on soft ground. This consists of a ring around the hub to which are fastened spoke-like long spokes running through slots in the rim of the wheel. A lever is connected to the ring at the center and by means of said ring can be rotated, forcing the spikes outward beyond the rim of the wheel. This lever is then dropped of its own spring into notches in the rim, locking the spikes in their extended position. This spiked arrangement is a part of the regular equipment. Another device for operating in extremely soft ground is also supplied with the machine and at first glance reminds one of a paddle wheel. This consists of a rim which is attached and projects beyond the ordinary wheel rim at the outside. Upon this rim are pivoted flat plates which, when running on hard ground, lie in towards the center, but as soon as the wheel strikes soft ground, open outward and dig into the ground, giving great resistance.

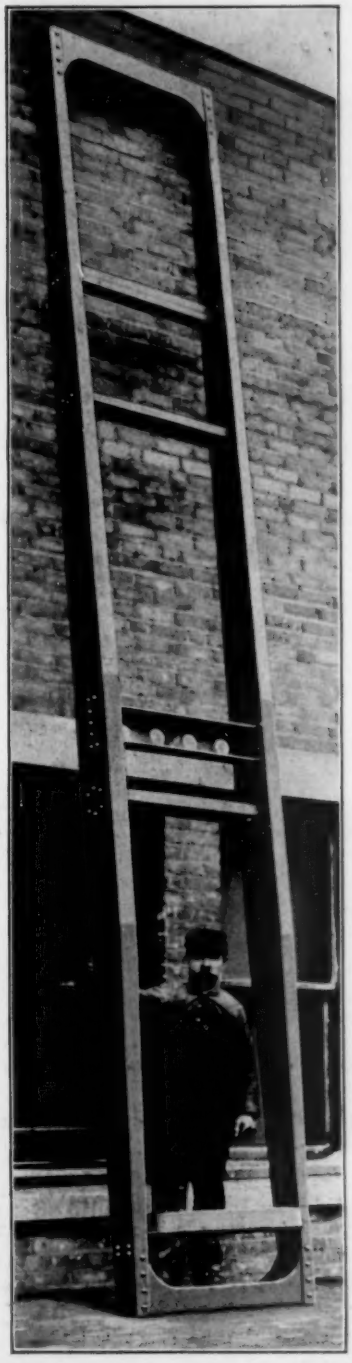
The springs are semi-elliptic front and rear and each mounted on top of the axles, the front axle being a built up construction of two rectangular forgings, bolted together and riveted at their ends to cast steel Le Moyne type fittings, which carry the steering pivot pins. The rear axle is solid rolled steel, 2¾ in. in diameter. The front springs are 2¾ in. wide, 42 in. center to center, banded and shackled at the rear end, shackles and pivots fitted with grease cups.

The standard equipment consists of a platform body, the tractor equipped in this manner selling at $2500.

The Trucks

The general construction of the trucks is the same as that given in detail of the tractors. The wheels are of the ordinary type, fitted with solid rubber tires, the standard equipment being 34 by 4 in., dual at the rear and the same size single tires in front. One of the features of the body construction of these models is the fitting of the front with a large cab with full height doors, glass front and sides, completely housing and protecting the operators. These machines sell for $3000 with a regular hard wood loading bed 52 in. wide by 126 in. in length. The enclosed front or cab-like construction, known as the coupe, is $600 additional.

Hydraulic Pressed Steel Co.



TRUCK FRAMES

½ TON TO 10 TON

HYDRAULIC PRESSED STEEL CO.

CLEVELAND, OHIO

R. B. McMULLEN, General Sales Agent, Chicago, Ill.

A Tire for Every Purpose

EVERY TYPE of commercial motor car, whether gasolene, electric or steam—Every capacity from light delivery to five-ton truck—Every degree of speed and road condition—In fact, every need and circumstance affecting tire service is exactly met by one of the various types of

"Firestone"

SIDE-WIRE TIRES

The World's Standard

Furnished on regular channel or flange rims. Also on Firestone Quick Removable Rims for quick tire-changing right on the spot—over two years in successful use.

Every Delivery Problem Can Have the Benefit of Firestone Quality

AS A MATTER OF COURSE } Firestone Side-Wire tires "led the procession" at the New York Motor Truck Parade April 22 with 26½ sets. Nine competitors followed with 11, 7½ and 4½ sets and so on down.

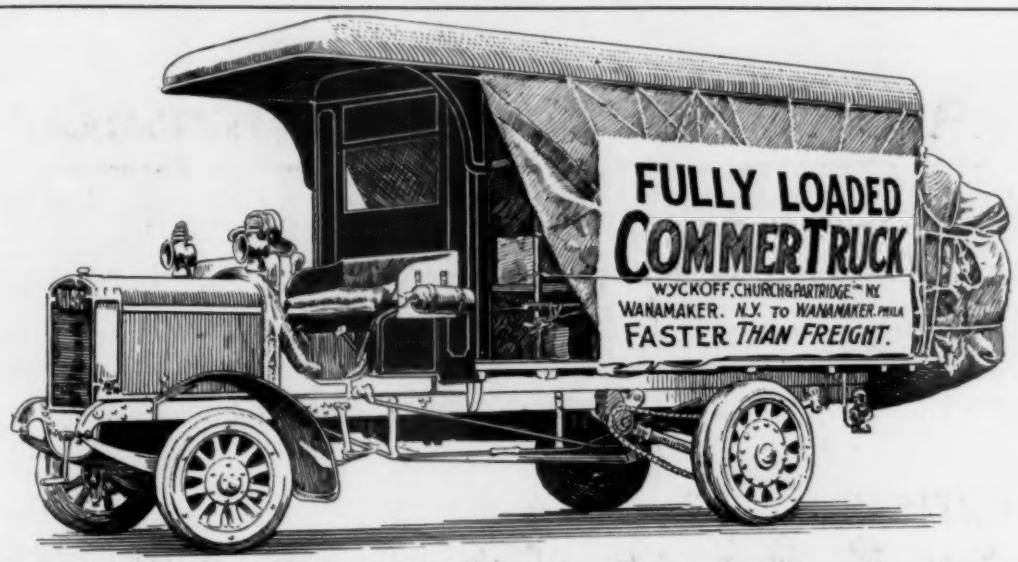
The experience we have gained in equipping most of the commercial cars now in operation, is at the disposal of your own tire problems. Write us for information.

The Firestone Tire & Rubber Co., Akron, Ohio

"America's Largest Exclusive Tire and Rim Makers"

ATLANTA, 58 Auburn Ave.
BALTIMORE, 204 St. Paul St.
BOSTON, 145 Columbus Ave.
CHICAGO, 1442 Michigan Ave.
CINCINNATI, 333 East Fifth St.
CLEVELAND, 1918-22 Euclid Ave.
DALLAS, 1415 Commerce St.
DENVER, 28 West Colfax Ave.
DETROIT, 240-2 Jefferson Ave.
JACKSONVILLE, 12 East Adams St.
KANSAS CITY, 1737 Grand Ave.
LOS ANGELES, 1239 South Olive St.
LOUISVILLE, 928-30 South Third St.
MEMPHIS, 68 South Second St.
MILWAUKEE, 568 Market St.
MINNEAPOLIS, 311 South Fifth St.
NEW ORLEANS, 613-15 Baronne St.
NEW YORK, 1871-75 Broadway.
OKLAHOMA CITY, 416 North Broadway
OMAHA, 2127 Farnam St.
PHILADELPHIA, 256 North Broad St.
PITTSBURG, 5904 Penn Ave.
PORTLAND, ORE., 510 Alder St.
ST. LOUIS, Cor. 23d and Olive Sts.
SALT LAKE CITY, 147-49 South State St.
SAN FRANCISCO, Cor. Van Ness Ave. and Fulton St.
SAVANNAH, Cor. Perry and Drayton Sts.
SEATTLE, 918 East Pike St.
SYRACUSE, Hanover Square.
WASHINGTON, 1736 14th St., N. W.
WICHITA, 227-229 South Lawrence Ave.
MEXICO CITY, la Ave., Juarez No. 88.

100 sales and applying stations give you best and quickest service



Note that we started to go "faster than freight." We were too conservative. We really went faster than express

Commer Trucking *vs.* Express

IT is a fact that in many cases the sturdy Commer Truck can deliver goods from one city to another more quickly and with less cost than by Express. Please read this absolute proof.

On the night of April 6th, John Wanamaker's New York store put a 4-ton load on the above 4½-ton Commer Truck. The load included a piano, furniture, marble slabs and general merchandise.

At 3:55 A. M. on the morning of April 7th this Commer Truck left the Wyckoff, Church & Partridge New York City Building carrying the 4-ton load and six men.

Without strained effort or stunt driving it went from our headquarters in New York to John Wanamaker's, Philadelphia, in 7 hours and 35 minutes—this time including ferry delays of 35 minutes.

After unloading at Philadelphia, another load of over three tons was put on the truck for the return trip. The six men also returned on the truck. The return trip was made in just seven hours.

Now here comes the almost unbelievable part. The cost of that entire trip was:

Driver ($20 a week) Day's work plus 5 hours at time and one-half extra	**$6.16**
40 Gallons gasoline at 11c. per gallon	**4.40**
Three pints lubricating oil	**.20**
Grease	**.20**
Maintenance 4c. a mile (based on maintenance contract)	**8.80**
Tires 7c. a mile (based on manufacturer's guarantee)	**15.40**
Insurance at 50c. per day (approx. $150 per annum)	**.50**
Depreciation 3c. a mile (based on proved records)	**6.60**
	$42.26

Distance covered was 220 miles. Approximate cost per mile was 19.8c. Average running time 15¼ miles per hour. No adjustments were needed en route. There were no scratches on the Polack Tires, although the Truck had to go over a good bit of crushed stone at various parts of the run.

These loads to and from Philadelphia would have cost nearly twice as much by express.

The time necessary to express them, together with time of unloading and carting to and from trains to the stores, would have been considerably more than the time the Commer Truck took.

So the Commer was quicker and more economical than express would have been.

Please remember this was no stunt run. It was a simple task for a Commer. That same Truck did over 800 miles of continuous demonstration service during the week of the run. The very night before the Wanamaker-to-Wanamaker trip it had run from 8 P. M. to 6 A. M. carrying three big loads for the Horton Ice Cream Company, from Jersey City to Brooklyn, lower New York, and 125th Street, New York, respectively.

The run simply confirms the faith we have in the Commer Truck—a faith founded on two years of expert investigation of motor trucks both here and abroad, and proved records of economy together with the fact that not one of the many seven-year-old Commer trucks has worn out. We knew after that investigation that the Commer was the world's best high-duty motor truck.

We can prove to your absolute satisfaction that the Commer is the truck for you. If you are within reach of us or any of our agents, we will do this by actual demonstration. There will be no empty promises or general talk. We want you to try the Commer on your special trucking problems, for comparative tests have sold more Commer Trucks than our advertising or personal salesmanship ever will.

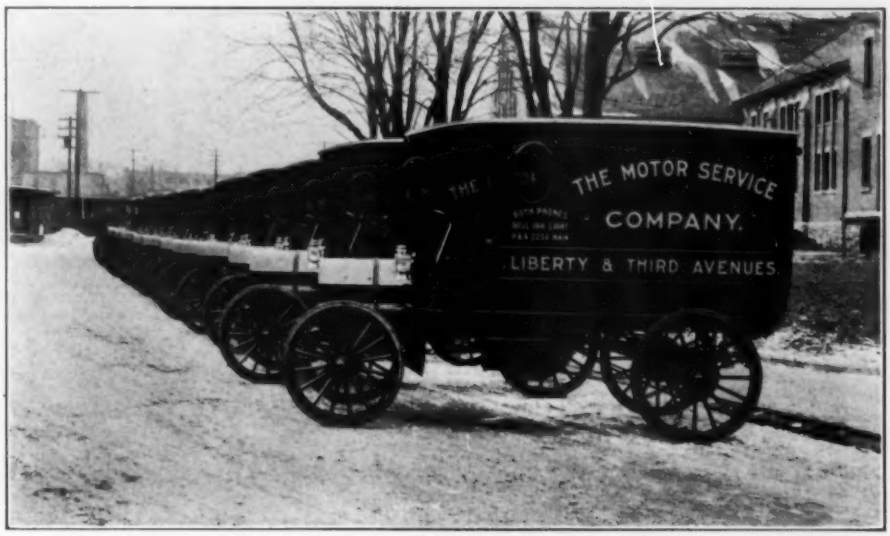
The Commer Truck comes in four sizes—2½-ton, 3½-ton, 4½-ton and 6½-ton. Write us regarding your trucking problems.

WYCKOFF, CHURCH & PARTRIDGE, INC

BROADWAY AT 56TH STREET, NEW YORK **The Most Complete Motor Service in America**

We shall be pleased to negotiate for the Commer Truck Agency with dealers in other large cities

Chase Motor Vehicles Selected by the Big Ones Who Know



Ordered by the dozen both at home and abroad.

The following orders for Chase Motor Wagons in quantity have been shipped within the past few days:

Berlin Dye Works, Los Angeles, Cal. - -	10
Fleischmann Co., several cities - - - -	8
Pittsburg Motor Service Co., Pittsburg, Pa. -	10
Molinero Co., Buenos Ayres, Argentine Rep.	10

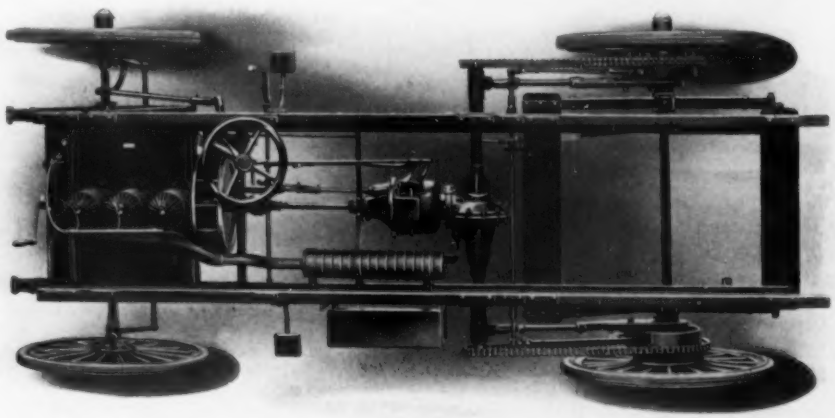
There are reasons why conservative business men buy Chase Wagons in these quantities.

1—Because the Chase is not an experiment. It has made good under all climatic conditions and over all roads and grades.

2—Because the Chase is simpler and easier to operate than any other motor wagon ever built.

3—Because low maintenance and repair costs have actually proved its economy. You deal with FACTS not theories when you investigate the Chase.

Ten pages in this book would not be sufficient to enumerate the advantages of the Chase.



Send for our 1911 *Catalog. It's Free.*

Chase Motor Truck Co., 10 Jefferson St., Syracuse, N. Y.

UNITED STATES TIRES

UNITED STATES TIRES

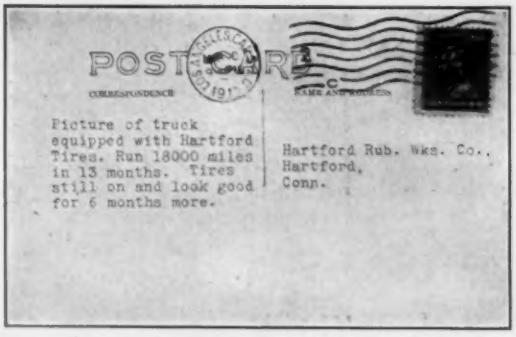
A SHORT STORY
OF
A LONG LIFE

"18,000 MILES IN 13 MONTHS—GOOD FOR 6 MONTHS MORE"

Hartford
Morgan & Wright

THESE UNITED STATES SOLID MOTOR TIRES were purchased at the same price you pay for *ordinary* truck tires.

THEIR ULTIMATE LIFE IN SERVICE will probably exceed *25,000 miles.*


POSTCARD

CORRESPONDENCE

Picture of truck equipped with Hartford Tires. Run 18000 miles in 13 months. Tires still on and look good for 6 months more.

Hartford Rub. Wks. Co.,
Hartford,
Conn.

AND THEIR EXCEEDINGLY LOW COST PER MILE reflects the *proven* service-economy of UNITED STATES SOLID MOTOR TIRES.

Write today for complete catalog and price list of these superior tires

UNITED STATES TIRE COMPANY
Broadway at 58th Street, New York

Branches in All Large Cities

UNIFORMLY SUPERIOR TIRES

UNIFORMLY SUPERIOR TIRES

McIntyre

COMMERCIAL POWER WAGONS

In the Newspapers of America

The Greatest Advertising Campaign Ever Used in the Sale of an Automobile Truck

All Advertising To Be Done Over the Name of the Local Dealer

IMPORTANT ANNOUNCEMENT

If you are a live, up-to-date dealer and have the facilities and ability to sell the greatest commercial power wagon ever built, you should immediately get into touch, by wire, 'phone or letter, with our Sales Department. We are inaugurating an advertising campaign which, for effectiveness, will be unique in the annals of the commercial power wagon. We propose to advertise the McINTYRE Commercial Power Wagon **over the name of the dealer** in the newspapers of the town in which the dealer lives and does business. We propose, by this method, to get live, up-to-date inquiries from those who are interested in power wagons, so that the dealer can follow them up direct.

This Means Big Business For McINTYRE Dealers:

It means working along lines of least resistance. Your advertisement, appearing in your local newspapers over your own signature, goes into the hands of your local business people and will be read by them, and all inquiries will go to you direct.

The advertisements for the newspaper campaign have been prepared by one of the largest advertising agencies in the country—a concern that has had a lot of experience in producing effective copy.

This is one of the greatest opportunities ever offered to power wagon dealers.

Act at once! Send in the coupon now—before you lay aside this publication. Full particulars will be sent by return mail.

W. H. McIntyre Co., Auburn, Indiana

McIntyre

COMMERCIAL POWER WAGONS

The McINTYRE Commercial Power Wagon has proved its adaptability to every commercial need. It has been aptly called the "World's Greatest Power Wagon" and is making good wherever it is in service. There has never been a commercial power wagon made that—price considered—could compare with the McINTYRE.

On account of the popularity and increased sale of our power wagons, we have increased our manufacturing facilities and are in a position to consider applications on the part of live, up-to-date dealers. First come, first served.

☞Investigate the McINTYRE Heavy Duty Motor with the automatic governor, which absolutely prevents overspreading—the source of 90% of all motor truck troubles. Note the following specifications and then write for further particulars.

Capacity—2000 pounds.
Wheel Base—119 inches.
Tires—Solid rubber; 2½ inches.
Horsepower—24
Cooling—Water cooled.
Speed—2 speeds forward, 1 reverse; 4 to 12 miles an hour.
Mileage Capacity per Gallon—12 to 15 miles.
Ignition—Dual system magneto and dry cells.
Equipment—3 oil lamps, horn, tools and jack.
Net weight—2300 pounds.

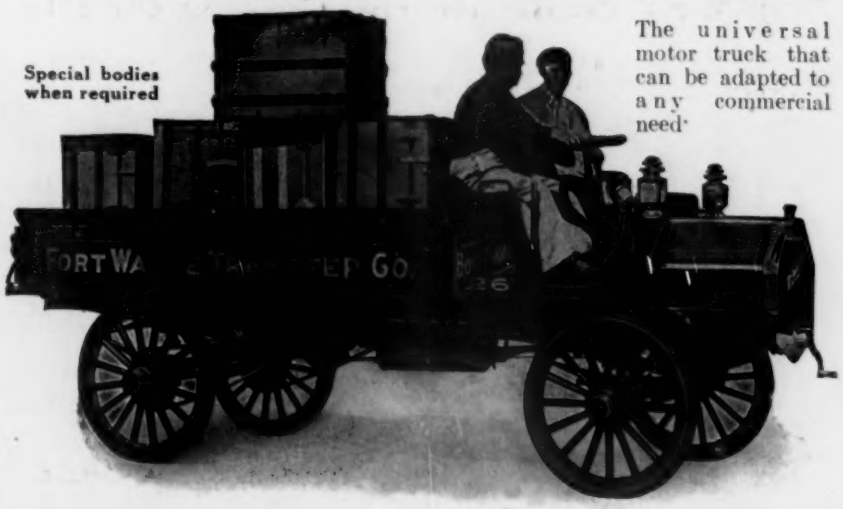
Bore—5¼. Stroke—4¼.
The owner, not the driver, controls the speed. Built for hard service.

Special Features. Price, $1350

Accessibility
Simplicity
Abundance of power
Mechanical correctness
Sturdiness
Guarantee
Large bearings
Automatic governor on engine, which absolutely prevents overspeeding.

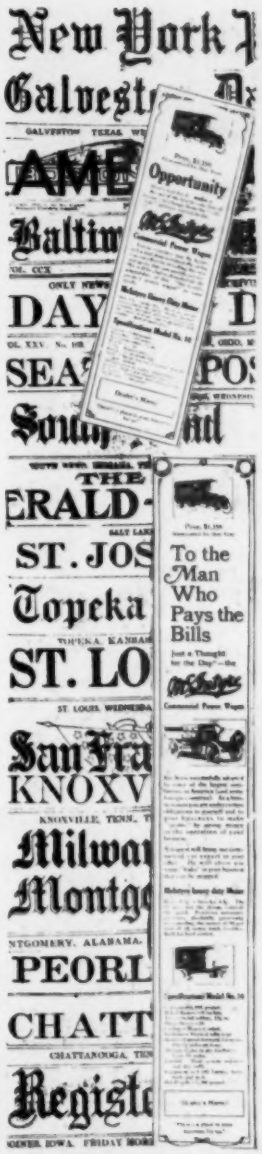
The motor truck that will positively "stand up" under any and all conditions, and the whole guaranteed to come up to all specifications.

W. H. McIntyre Co., Auburn, Indiana



Special bodies when required

The universal motor truck that can be adapted to any commercial need.



COUPON

W. H. McIntyre Co., Auburn, Ind.

Gentlemen:—Please send full particulars regarding your national newspaper campaign, advertising your commercial power wagon over the dealer's name.

Name . . . . . .

Address . . . . . .

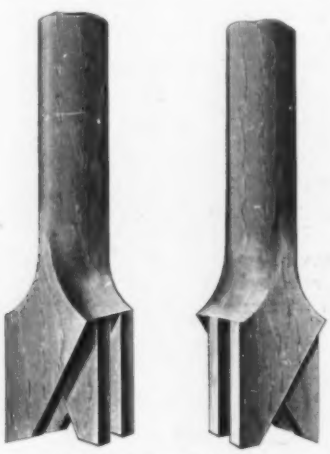
City . . . . . State . . . .

Wheel for Heavy Motor Truck

The Schwarz Wheel

has become recognized as the standard of quality. The question usually asked of a wheel maker by a wheel buyer is: "How do your wheels compare with the Schwarz?"

There is no secret about the success of our wheels, for we use the best of selected stock and our construction insures greatest strength.



Schwarz Patent Spokes

Spokes at the tenon are grooved and mortised and interlock, forming an absolutely compact, immovable assemblage, which cannot loosen under the most severe strain. The only wheel with positive and evenly distributed spoke support. Can be made and shipped complete without hub.

We were pioneers in the manufacture of the heavy truck wheel, and have made of it a careful study. We maintain a special, fully equipped department for this work, and are prepared to design and proportion wheels in proper keeping with the other features of construction. Our engineers are at your disposal.

All the leading manufacturers of Motor Trucks use the **Schwarz Wheel**—strong evidence of its superiority. It is the only wheel which will stand up continuously under heavy stress.

Send for Illustrated Booklet

Don't hesitate to write us for fear our prices are too high. We sell wheels as cheap as you can buy satisfaction.

The Schwarz Wheel Company

Frankford, Philadelphia

BENZ 7-TON TRUCK

Winner Reliability Contest
Philadelphia to Atlantic City
1910

This Letter Speaks for Itself

New York, Sept. 2, 1910.

Wm. Cramp & Sons,
Philadelphia, Pa.

Gentlemen:—

THE CRAMP'S SPECIAL BEARING BRONZE bearings furnished us for one of our trucks during the recent reliability run from Philadelphia to Atlantic City have given us **entire satisfaction,** and they seem to be very well fitted for the purpose used. We have not had occasion to take these off since they were fitted in.

The bearings seem to be **running without any heat** at the present time, and apparently are not scored to any extent, and are giving us **excellent satisfaction.** Yours truly,

Benz Auto Import Co.
of America,
Fred H. Cozzens,
Manager, Truck Department.

William Cramp & Sons Ship & Engine Building Co.

PHILADELPHIA, PENNSYLVANIA, U. S. A.

ALDEN SAMPSON

4-TON TRUCK

Winner Chicago to Milwaukee Contest—1910

William Cramp & Sons,
Philadelphia, Pa.

Detroit, Mich., April 22, 1911.

Gentlemen:—

Referring to your letter of April 18th we desire to say that your **PARSONS' WHITE BRASS** has always given us excellent satisfaction as would be evidenced by our last orders. Your **PARSONS' MANGANESE BRONZE** we consider *par excellence* and have never had a failure with it

Yours very truly,
Alden Sampson Manufacturing Co.
P. H. Breed, Chief Engineer.

ANNOUNCEMENT

IN line with improved and enlarged facilities for promptly serving our ball bearing patrons, we have established a western branch at Detroit, Rooms 1016-1017 Ford Building, where a stock of

New Departure Double Row, or Combined Radial and Thrust Ball Bearings

New Departure Single Row Ball Bearings

will be carried and sales and engineering force maintained.

Our enlarged engineering department at either Bristol or Detroit is prepared to give prompt and expert consideration of bearing problems in the construction of automobiles, motor trucks, taxicabs, aeroplanes, and, in fact, machinery of any description. Submit to us your blue prints with data covering loads and speeds and we will cooperate with you in the selection of the proper bearing for doing the work economically and efficiently.

No charge is made for this service.

We solicit opportunity to demonstrate the numerous advantages of New Departure bearings, the successful use of which in all mechanism commends them to your serious consideration.

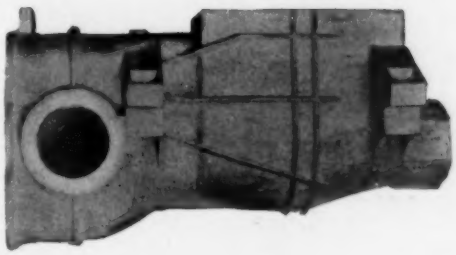
THE NEW DEPARTURE MFG. COMPANY
BRISTOL, CONNECTICUT

AUTOMOBILE BRAND

CASTINGS

Get Good Bearings

Good bearings carry weight with little fuel expense.



AUTOMOBILE BRAND

PLASTIC BRONZE for general bearings.
PHOSPHOR BRONZE for hardened and ground shaft.
DIE CASTINGS when the compression strain is not excessive.

The practical buyer will figure what it costs to carry each pound of dead weight a year; this is constant load and more important than capacity load, as it catches you going and coming.

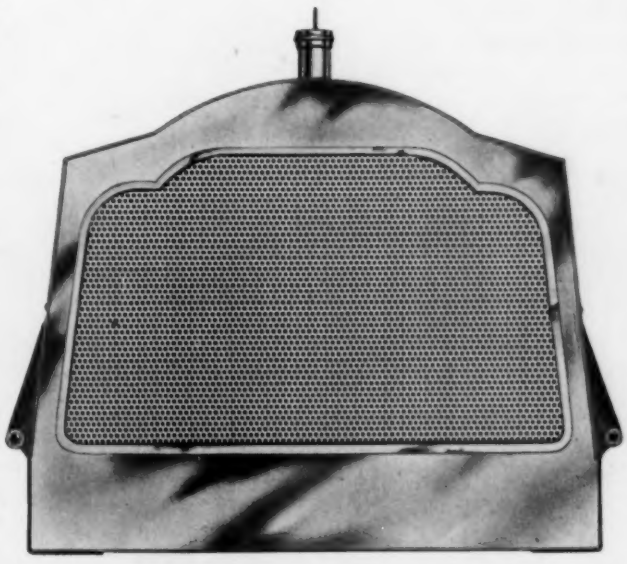
AUTOMOBILE BRAND

ALUMINUM castings weigh only one-third as much as Red Brass, are about as strong, and better suited for many purposes.

MANGANESE BRONZE is a good substitute for drop forgings when the quantity will not warrant the cost of dies, and when prompt deliveries are a factor.

LIGHT MANUFACTURING & FOUNDRY CO., POTTSTOWN, PA.

VITALLY IMPORTANT



to the success of a motor truck is the RADIATOR,—this fact is universally recognized —no other part deserves the same consideration.

We manufacture radiators for nearly every manufacturer of high-grade automobiles. If you will write us, we can give you a list of the most successful automobile makers in America,—all of whom use

FEDDERS RADIATORS

What does this prove to you?

FIRST—that we have the most satisfactory radiator; SECOND—that we have the facilities for manufacturing in quantities, so that we can DELIVER ON DATES PROMISED.

Commercial Cars require radiators that will withstand all sorts of wear and tear and severe road shocks,—it is this fact that prompts the leading makers of trucks to use FEDDERS RADIATORS.

Our new catalog contains a world of valuable information for those afflicted with Radiator troubles,—you're sure to find a remedy somewhere in its pages.

MAY WE SEND IT?

FEDDERS MANUFACTURING WORKS, BUFFALO, NEW YORK

MOTOR TRUCK BANDS

FOR

SINGLE OR DUAL TIRES

MATERIAL—We are putting into the construction of our bands the very best material obtainable.

WORKMANSHIP—Our men have become proficient in this line of work through experience gained in the growth of our motor truck band business.

PRICE—The process of electric welding together with the volume of work done in this department assures satisfactory prices.

DELIVERY—An unexcelled equipment for the handling of this trade and recent additions to our factory enable us to give good deliveries.

We solicit your orders along the lines above mentioned

THE STANDARD WELDING CO.

Western Representative,
L. F. McCLERNAN,
1243 Peoples Gas Bldg., CHICAGO
1417 Ford Bldg., DETROIT

ELECTRIC WELDING PIONEERS

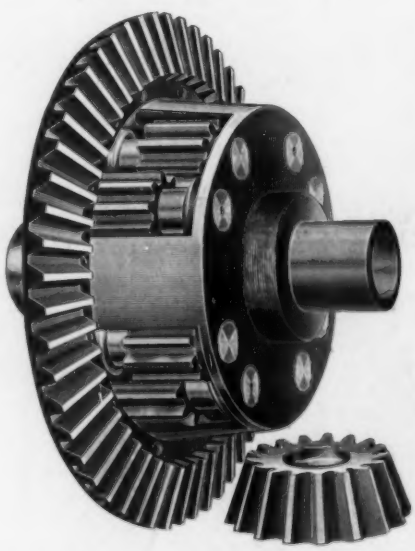
CLEVELAND

Eastern Representative,
L. D. ROCKWELL,
United States Express Bldg., NEW YORK

CULLMAN SPROCKETS and Differentials

in stock and to order.

Send for catalog and let us quote you on your requirements.



CULLMAN WHEEL COMPANY, CHICAGO

1351 GREENWOOD TERRACE

ATTENTION

Commercial Car Manufacturers, Dealers and Consumers!

The perfect ignition for power trucks is the magneto built for commercial car service, not the delicately made pleasure car magneto. You require strength for service for your truck ignition and for maximum reliability you should use the special commercial car model of the

K-W MAGNETO

Guaranteed to start any Auto Engine up to 30 H. P. on a quarter turn of the crank.

Gives a blood-red, pure, dynamic spark that ignites the mixture quickly and thoroughly, giving all the power out of the engine there is in it,—not merely a white, static spark that goes through the mixture without firing it.

Has nearly half less parts than the ordinary High Tension Magneto. Weighs less than 15 pounds.

Write for full information.

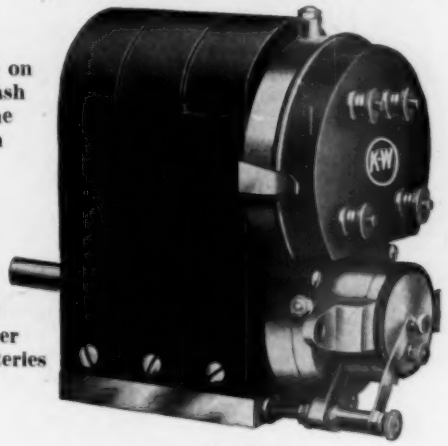
We have other models for other engines,—our Model H-T for engines up to 400 H. P. and larger.

We also make $35.00 K-W Low Tension belt or friction drive Magnetos for use with the K-W Coil, and the K-W $50.00 Electric Road Lighting Outfit.

K-W Coils have their windings guaranteed forever against breakdown. $30.00 for 4-Cylinder Dash.

Write for catalogue.

Nothing on the dash but the switch

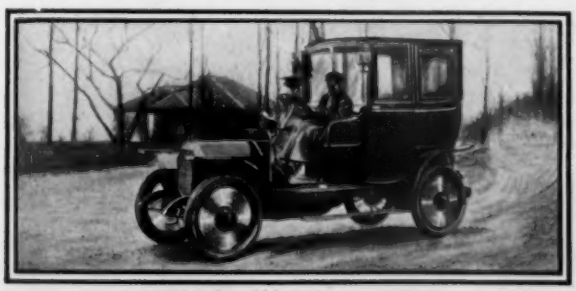


No Coil
No Timer
No Batteries

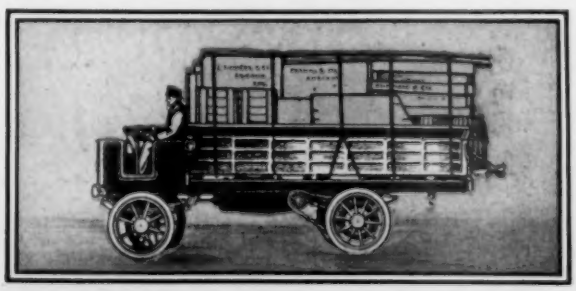
MODEL J

1 Cylinder	$40.00
2 3 or 4 Cylinder	50.00
6 Cylinder	55.00

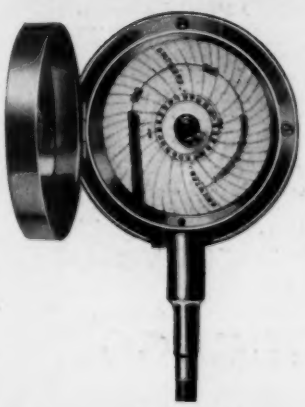
THE K-W IGNITION Co.
41 Power Ave. CLEVELAND, OHIO. U.S.A.



$3000. INVESTED



$5000. INVESTED



Jones Recorder

Do You Realize What This $50 Time Clock Will Do

Toward increasing the efficiency of your motor truck or taxicab? The

JONES RECORDER

is a small insurance premium on your big motor car investment,—get one for your commercial vehicle.

With the Jones Recorder you can have a record of the EXACT performance of your vehicle and of your delivery operators and drivers—every hour of the day. You can see exactly the rate traveled and time consumed in stops.

Each record is made on a circular disc which can be removed and a new one substituted every 24 hours, or weekly as desired. The Jones Recorder consists of a strong brass casing, containing a clock work and flexible shaft from the drive wheel of the vehicle.

Ask for particulars.

THE JONES SPEEDOMETER
United Manufacturers, Distributors 250 West 54th Street, New York

Covert Transmissions and Jackshafts for Commercial Trucks

are the product of ten years of careful and conscientious study and experimental work, and represent the highest degree of efficiency and reliability in transmission construction.

Before deciding upon the specifications for your new models, let us show you in detail the many advantages of this combination.

Write for our descriptive booklet.

Covert Transmissions

have been used for several years with perfect satisfaction by many of the leading manufacturers.

Covert Jackshafts

are made in several sizes for commercial cars and trucks ranging from ½-ton to 3-ton capacity.

COVERT MOTOR VEHICLE CO.

Transmission Specialists (The name "COVERT" on a transmission case is reliability insurance) LOCKPORT, NEW YORK

AUTOBESTINE

BEST BRAKE LINING

WOVEN STEEL HOSE & RUBBER CO.

TRENTON N.J.

FOR PRICES AND FULL PARTICULARS
WRITE TO THE SOLE MANUFACTURERS

WOVEN STEEL HOSE & RUBBER CO.
TRENTON, N. J.

NATIONAL SALES CORPORATION, Factory Sales Manager
250 W. 54th Street, New York
DETROIT: 874 Woodward Ave. CHICAGO: 1436 Michigan Ave.

Red Head

TRADE MARK

SPARK PLUG

To make sure that big spark plug expense does not prevent you from winning the Commercial Car Journal's Economy Contest—be sure to use RED HEAD Spark Plugs.

It's the RED HEAD that provides maximum efficiency at the lowest safe limit of cost.

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It's the RED HEAD that is used by leading motor truck manufacturers as standard equipment.

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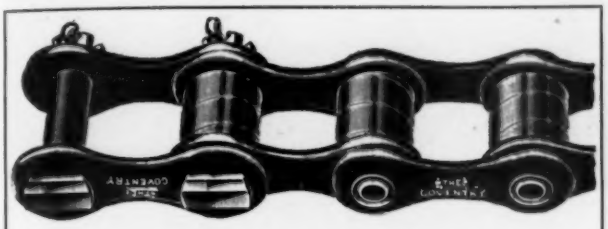

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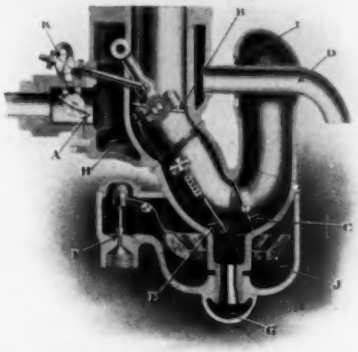

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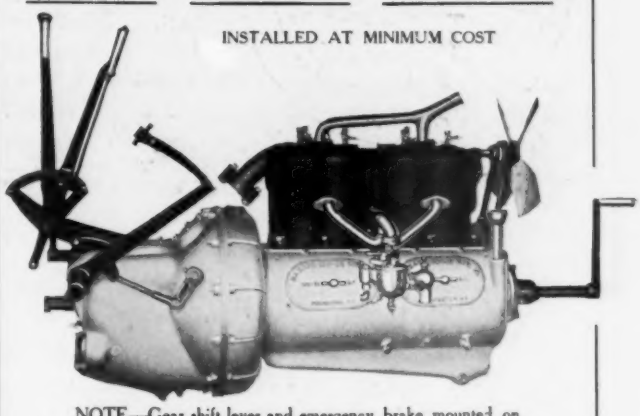

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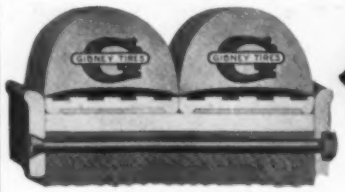

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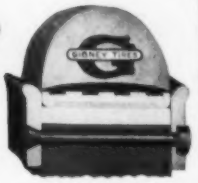

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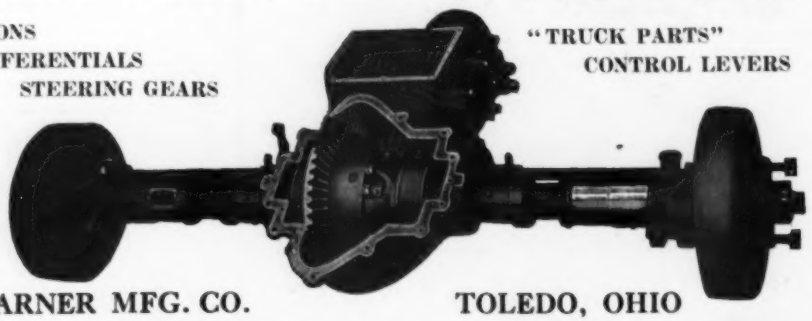

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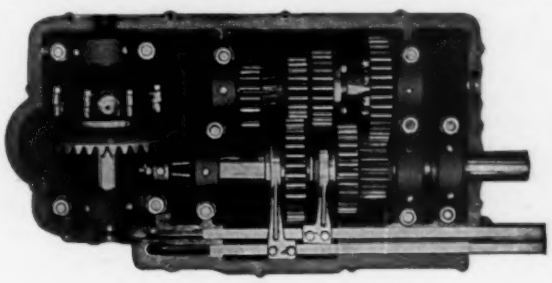

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This transmission was designed for Commercial Cars, and will withstand the hard usage to which automobiles are subjected when employed in trucking service.

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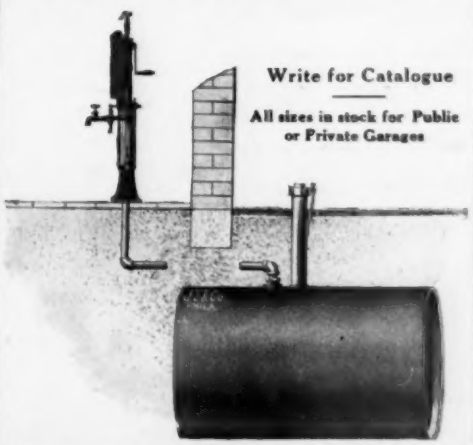

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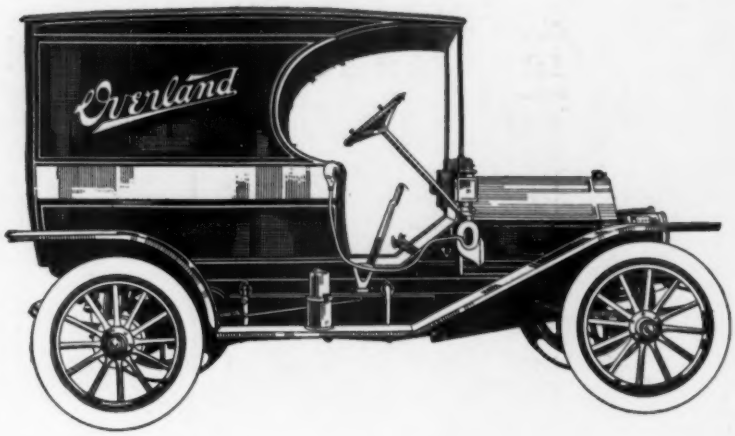

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